1745

Form: PTO/SB/17 (Modified)

# REPLY/AMENDMENT FEE TRANSMITTAL

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|---|---|
| Attorney Docket No. | 911319 |
| Application Number | 09/009,294 |
| Filing Date | 1/20/1998 |
| First Named Inventor | Mills |
| Group Art Unit | 1745 |
| Examiner Name | Kalafut |

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|---|---|
| AMOUNT ENCLOSED | $ 445 |

OIPE JC99 MAR 0 1 2001 PATENT & TRADEMARK OFFICE

## FEE CALCULATION (fees effective 10/01/97)

| CLAIMS AS AMENDED | Claims Remaining After Amendment | Highest Number Previously Paid For | Number Extra | Rate | Calculations |
|---|---|---|---|---|---|
| TOTAL CLAIMS | 819 | 819 | 0 (3) | X $18.00 = | 0 |
| INDEPENDENT CLAIMS | 21 | 21 | 0 | X $78.00 = | 0 |

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| Since an Official Action set an original due date of 12/1/00, petition is hereby made for an extension to cover the date this reply is filed for which the requisite fee is enclosed (1 month ($110); 2 months ($400); 3 months ($950); 4 months ($1,510); 5 months ($2,060)): 3 Months | 890 |
| If Statutory Disclaimer under Rule 20(d) is enclosed, add fee ($110) | |
| Total of above Calculations = | $890 |
| Reduction by 50% for filing by small entity (37 CFR 1.9, 1.27 & 1.28) | -445 |
| TOTAL FEES DUE = | $445 |

(1) If entry (1) is less than entry (2), entry (3) is "0".
(2) If entry (2) is less than 20, change entry (2) to "20".
(4) If entry (4) is less than entry (5), entry (6) is "0".
(5) If entry (5) is less than 3, change entry (5) to "3".

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TC 1700

## METHOD OF PAYMENT

[X] Check enclosed as payment.

[ ] Charge "TOTAL FEES DUE" to the Deposit Account No., below.

## AUTHORIZATION

[X] If the above-noted "AMOUNT ENCLOSED" is not correct, the Commissioner is hereby authorized to credit any overpayment or charge any additional fees under 37 CFR 1.16 or 1.17 necessary to maintain pendency of the present application to:

| | |
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| Deposit Account No.: | 50-0687 |
| OrderNo.: (Client/Matter) | 62-226 |

SUBMITTED BY: Manelli, Denison & Selter, PLLC, Customer No.: 20736

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|---|---|---|---|
| Typed Name | Jeffrey S. Melcher | Reg. No. | 35,950 |
| Signature | | Date | March 1, 2001 |

#29/09
03.09.01

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re PATENT APPLICATION of
Inventor(s): Mills

Group Art Unit: 1745

Appln. No.: 09/009,294

Examiner: Kalafut

Filing Date: 1/20/1998

Title: HYDRIDE COMPOUNDS



* * * * *

March 1, 2001

**RESPONSE**



Hon. Asst. Commissioner
of Patents and Trademarks
Washington, D.C. 20231

Sir:

The pending Office Action dated September 1, 2000 rejecting previously allowed claims 1-299 was filed in violation of 35 U.S.C. §§ 151, 122 and 37 C.F.R. § 1.131(b). Accordingly, Applicant files this Response to that unlawful Office Action under protest and demands that the PTO immediately issue the subject application as a U.S. patent in compliance with all applicable statutes and regulations.

All Office Actions, Responses, supporting documents, and other papers introduced into the PTO's official file history of the subject application after payment of the issue fee on October 21, 1999 are not properly part of the file history. Applicant therefore further demands that all such papers be stricken from the file history upon issuance of the patent to which Applicant is entitled.

In support of its unlawful Office Action, the PTO now raises precisely the same issues under 35 U.S.C. §§ 101, 112 that had been previously disposed of during the first complete examination of the subject application. Indeed, after thoroughly considering Applicant's arguments and the scientific evidence in support of the operability of the disclosed compounds, the Examiner of record, Stephen Kalafut, determined that Applicant was entitled to a patent under the law and, as directed by 35 U.S.C. § 151, issued a written Notice of Allowance reflecting that entitlement. [Paper No. 15, dated October 18, 1999] In response to the Notice of Allowance, Applicant paid the issue fee with the expectation that the PTO would comply with the additional statutory directive of Section 151 requiring that "the patent shall issue" once the issue fee has been paid.[1]

Unfortunately, the Patent Office and other "outside forces" had other plans, which resulted in the unlawful withdrawal of the subject application from issue and issuance of the pending Office Action. Even assuming the PTO had the proper statutory authority to withdraw the application from issue—which it did not—it did so under extremely suspicious circumstances, without even the slightest review of the application, in violation of 37 C.F.R. § 1.313(b). [See letters to Director Kepplinger, dated March 28, 2000 and January 19, 2001 (Attachments 53 and 54)] That regulation provides in relevant part that once an Applicant has paid the issue fee, an application cannot be withdrawn for any reasons except the "unpatentability of one or more claims."

The PTO has conceded that it never even looked at the subject application, and, thus, failed to make even a preliminary determination that any of the claims were in fact

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[1] These and other arguments made herein are more fully detailed in the attached briefs filed in Applicant's appeal to the Federal Circuit in *BlackLight Power, Inc. v. Q. Todd Dickenson*, Appeal No. 00-1530 (Attachment 52). The Federal Circuit has yet to set a date for hearing this appeal, which will be argued by Donald R. Dunner, Esq. of Finnegan, Henderson, Farabow, Garrett & Dunner on behalf of Applicant.

unpatentable before withdrawing it from issue.[2] [See Briefs filed in Applicant's appeal to the Federal Circuit in *BlackLight Power, Inc. v. Q. Todd Dickinson*, Appeal No. 00-1530 (Attachment 52)]. Having violated the express language of 37 C.F.R. § 1.313(b), the PTO had no valid legal basis for issuing the pending Office Action.[3]

Inexplicably, there is still no indication in the record that the PTO has properly reviewed the entire application file in summarily concluding that claims 1-299 are unpatentable under 35 U.S.C. §§ 101, 112. The present Office Action fails to even address, much less controvert, the considerable scientific evidence already of record, which conclusively demonstrates the operability of Applicant's claimed compounds.[4] Rather than fairly evaluate this "real-world" evidence, the PTO, in its Office Action, presents strained theoretical arguments that do little more than demonstrate its misunderstanding of fundamental scientific principles.

In an attempt to resolve all outstanding issues relating to the patentability of Applicant's invention disclosed and claimed in multiple pending applications, Applicant, along with his counsel, Jeffrey S. Melcher and Jeffrey A. Simenauer, and BlackLight

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[2] Indeed, the PTO in its Notice of Withdrawal indicated that the allowed claims might in fact be patentable, noting that a second Notice of Allowance was one available option upon return of the application to the Examiner.

[3] By reexamining the subject application, the PTO further violated 35 U.S.C. § 122, which requires that "[a]pplications for patents shall be kept in confidence by the Patent and Trademark Office and no information concerning the same given without authority of the applicant." The PTO failed to retain the confidence of the subject application when it published claim 17 and Fig. 1 in the Official Gazette on February 29, 2000, consistent with the Issue Notification Applicant had received indicating that the application was due to issue on February 29, 2000 as U.S. Patent No. 6,030,601. The PTO's violation of Section 122 is further ground for invalidating the unlawful Office Action entered in this case.

[4] Despite this glaring omission, Applicant submits herewith additional scientific evidence for the PTO's consideration that destroys any suggestion that the claimed invention is inoperable.

board member, Dr. Shelby T. Brewer,[5] attended an Interview on February 21, 2001. Applicant wishes to thank the Examiners of record in those cases, Stephen Kalafut and Wayne Langel, as well as Supervisory Primary Examiner, Steven Griffen, for the courtesy they extended during the Interview.

Other PTO personnel attending the Interview, not of record in the interviewed applications, included Solicitors Stephen G. Walsh and Henry Sawtelle. Applicant's counsel were rebuffed in their attempt to ascertain in what capacity these solicitors were representing the Patent Office and/or the Examiners in attendance. The only information they volunteered in this regard was that they were attending the Interview as "observers."

Because of the unusual circumstances surrounding the proceedings in the interviewed applications, Senator Max Cleland, Chairman of the Senate's Commerce Subcommittee, sent his representative, Donnie Turner, Esq. to attend and observe the Interview.

Also representing the Patent Office at the Interview was Examiner Vasu Jagannathan. Applicant notes that Examiner Jagannathan is not identified as the Examiner of record in any of the interviewed applications, nor does his name appear anywhere else in the files of those cases. The first time Examiner Jagannathan's name had been revealed to Applicant was during recent conversations with Examiner's Kalafut and Langel. [See letter dated January 19, 2001 to Director Kepplinger (Attachment 54)]. Applicant had suspicions that Examiner's Kalafut and Langel were not the true authors of the renewed Section 101 and 112 rejections, since the arguments presented were contrary to the positions they had previously taken in allowing six applications relating to Applicant's lower-energy hydrogen. Examiners Kalafut and Langel confirmed Applicant's suspicions and revealed the identity of certain members of a "secret committee" of Examiners, Supervisors and Directors formed to prosecute Applicant's applications behind the scenes. One of those secret committee

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[5] Dr. Brewer received his Masters degree and Ph.D. in nuclear physics from MIT and served as Assistant Secretary of Energy during the Reagan administration.

members was identified as Examiner Jagannathan. [Id.]

Applicant then contacted Examiner Jagannathan in an attempt to ascertain the true authorship of the recent Office Actions and whether he would attend the Feb. 21st Interview. Regrettably, Examiner Jagannathan took a confrontational tone and flatly refused to admit his role in prosecuting the subject applications, or to answer any other relevant questions relating to the Office Actions. He also refused to attend the Feb. 21st Interview. Only after Applicant sent the January 19, 2001 letter to Director Kepplinger (Attachment 54) was the identity of certain committee members confirmed, including Examiner Jagannathan, who was later instructed to attend the Interview. [See Letter of February 12, 2001 from Director Jacqueline M. Stone (Attachment 55)].

At the Interview, Examiner Jagannathan confirmed that he was not an Examiner of record in any of the pending applications. When formally queried as to his role in formulating the present Office Actions, Examiner Jagannathan refused to provide any insight on that topic other than revealing his status as a "consultant" and making some vague reference to having provided "input" to Kalafut and Langel, the Examiners of record. From his conduct during the Interview, however, Examiner Jagannathan appeared to be the lead Examiner, as he almost exclusively addressed the merits of the pending Office Actions and was the only one asking technical questions.

Applicant submits that he is entitled to know who on behalf of the Patent Office is responsible for prosecuting the subject applications and the extent to which anyone, including sources from outside the Patent Office, has provided input that resulted in the withdrawal of the '294 application from issue and the subsequent rejections that were entered in the pending Office Actions. To that end, as a preliminary matter, Applicant's counsel posed the following lines of inquiry during the Interview as reasonably related to the prosecution of the pending patent applications (see Attachment to Interview Summary):

1) Identification of all Examiners and/or other Patent Office personnel, other than those identified in the pending Office Actions, who were

consulted, or otherwise provided input, in the formulation of the rejections of record;

2) Identification of all outside consultants and/or other technical personnel, including, but not limited to, those of NIST, who were consulted, or otherwise provided input, in the formulation of the rejections of record;
3) Identification of all Patent Office officials responsible for the withdrawal of Application Ser. No. 009,294 from issuance and clarification of the factual circumstances surrounding that withdrawal; and
4) Identification of any and all outside sources of information that may have precipitated, or otherwise contributed to, the Patent Office's withdrawal of Application Ser. No. 009,294 from issuance.

In response to counsel's request for information, Examiner Jagannathan became quite hostile in his insistence that such information was not germane to the issues raised in the pending Office Actions and in his absolute refusal to discuss the matter further. When counsel simply tried to explain why the information requested was in fact germane to prosecution of the pending Office Actions, Examiner Jagannathan became even more acrimonious, threatening to immediately terminate the Interview if discussion on that subject continued.

Applicant takes strong exception to the Examiner's refusal to comply with what is clearly a reasonable request for information and hereby renews that request. Applicant is entitled to know the identity, qualifications, and interests of all those who might have played a role in the entry of the pending Office Actions, particularly those persons from outside the Patent Office. In addition to the publication of claim 17 and Fig. 1 of Applicant's '294 application, Applicant has made the PTO aware of other apparent violations of Section 122, including improper disclosures to Dr. Robert Park and outside consultants. [See January 19, 2001 letter to Kepplinger (Attachment 54)]. Applicant is entitled to know the full extent to which confidentiality of his applications has been

unlawfully breached. That is the only way Applicant can be provided with an open and honest venue in which to persuade those ultimately responsible for determining the fate of Applicant's applications.

Examiner Jagannathan's involvement in the pending Office Actions is a case in point. Without counsel's investigation that led to the discovery of Examiner Jagannathan's significant participation as part of a "secret committee" of Examiners overseeing the subject applications, Applicant would have been denied the benefit of his input at the Interview and the opportunity to present evidence to one of those who will pass judgment on that evidence.

Furthermore, during the Interview Examiner Jagannathan articulated numerous positions on behalf of the Patent Office that Applicant learned for only the first time - - positions that would never have been disclosed but for discovery of the Examiner's previously-kept secret involvement in the prosecution of the subject applications. Examiner Jagannathan's argument that information relating to the identity of those persons, such as himself, involved in the prosecution of these cases and the nature of their involvement is not germane is absurd on its face.

For instance, Applicant learned only at the Interview in response to questions that the amount of experimental evidence that would be necessary to satisfy the Patent Office and allow the applications to issue would depend greatly upon Examiner Jagannathan's personal input as to the sufficiency of that evidence.

Examiner Jagannathan made that point even more clear during the Interview when Applicant began to present substantial experimental evidence generated by highly-respected independent laboratories, universities and government agencies, reaffirming the operability of his lowered-energy hydrogen technology. In response, Examiner Jagannathan for the first time indicated the PTO's extreme position rejecting such evidence out of hand.

Despite the high reliability of this evidence, Examiner Jagannathan refused to even engage Applicant in any discussions on the merits and indicated that he would only be persuaded by evidence that was "published" in peer-reviewed journals. When

Applicant's counsel pointed out that such a standard would be tantamount to Applicant's competition prosecuting the subject applications, Examiner Jagannathan naively asserted that the people reviewing the published data are scientists, not competitors. It goes without saying that labeling the reviewers of Applicant's published data as "scientists" does not necessarily transform them into non-competitors.

Applicant was also taken aback by Examiner Jagannathan's reaction to the quantity of experimental evidence presented at the Interview, particularly his astonishing request that Applicant "not pile on the evidence."[6] Applicant has gone to considerable lengths and expense to collect experimental evidence that should easily overcome the rejections of record and convince the PTO to once again allow the subject application to issue. As discussed in detail below, this experimental evidence is not merely cumulative, but demonstrates the operability and enablement of the claimed invention by many different well-known and reliable experimental techniques. Applicant is entitled to have all of that evidence fairly considered and evaluated by competent PTO personnel. Unfortunately, Examiner Jagannathan has provided no indication that he is willing to do so.

For instance, Applicant presented numerous spectroscopic data reaffirming enablement of the claimed compounds. Examiner Jagannathan could provide no cogent response as to why the experimental evidence did not demonstrate the existence of lower-energy hydrogen. The only response Examiner Jagannathan offered was his misplaced belief that the spectroscopic data was "a bunch of squiggly lines" that could not be interpreted. From these comments, it appears that Examiner Jagannathan is not sufficiently qualified to interpret the experimental data submitted by Applicant.[7]

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[6] Examiner Jagannathan would not let Applicant complete his presentation of over 140 slides, which included unbiased, third-party experimental evidence. As for the evidence that was presented, Examiner Jagannathan provided no cogent reasons why that evidence did not demonstrate the existence of lower-energy states of hydrogen.

[7] During the Interview, Applicant requested that Examiner Jagannathan confer with a competent chemist who understands basic concepts of spectroscopic analysis, such as Examiners Kalafut and Langel who allowed the subject application and five

This experimental evidence was prepared by qualified, highly-skilled technicians using state-of-the-art equipment. Contrary to Examiner Jagannathan's assertions, the spectroscopic data presented is not merely "a bunch of squiggly lines," but rather, is capable of highly reliable interpretation by skilled technicians.

Examiner Jagannathan made many other nonsensical arguments during the Interview. One such argument was that the reaction of two potassium ions and a hydrogen atom was impossible because it was a three-body collision. Any chemist skilled in the art would readily understand that three-body collisions occur, but less frequently than two-body collisions. Indeed, the present application recognizes as much in stating that the reaction proceeds faster with reactions involving binary collisions compared to tertiary collisions.

Other sarcastic comments by Examiner Jagannathan made during the Interview raise concerns as to whether patentability of the subject application will be given a fair hearing. For instance, in an apparent attempt to discredit Applicant, Examiner Jagannathan sarcastically questioned whether Applicant has ever seen an electron. Despite the derogatory tone of the question, Applicant politely explained the obvious, namely, that no one has seen an electron and that one must rely on experimental data representing the theorized electron, such as scattering data, excited states, electron spin resonance, etc., that only model the electron. If the experimental data conflicts with a presented theory, then the theory must be revised since mere theories do not take precedence over real-world, physical experimental evidence. Applicant's experimental evidence supports Applicant's theory of the electron and the PTO, to this day, has not provided any counter-evidence, or any other cogent reason, to suggest otherwise.

Examiner Jagannathan also sarcastically asked how Applicant knows which ion of an identical ion pair would react, asserting that the disclosed reaction was impossible because the hydrogen atom would not know which potassium ion of the pair to react

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other applications based on the extensive experimental evidence disclosed.

with. Nonetheless, Applicant respectfully responded by noting that the Examiner's argument made no sense since it would preclude all symmetrical molecule reactions, which type reactions are well known by chemists. For example, water molecules are symmetrical and, according to the Examiner's argument, water would not be able to exist since the oxygen atom would not know which hydrogen atom to react with to form water. This argument by Examiner Jagannathan demonstrates a lack of understanding of basic chemistry and further raises the question as to why he has taken a lead role in prosecuting the present application.

Examiner Jagannathan also misstated that the Schrodinger equation could be extended by incorporation of Maxwell's equations. When pressed by Applicant, he recanted, only to rely on the Dirac equations instead of Maxwell's equations. Applicant further pointed out, without rebuttal by the Examiner, that such a solution provides negative kinetic energy states, infinities, virtual particles and negative energy states of a vacuum, all of which are nonsensical and do not represent physical reality. Applicant's full response to these misplaced arguments are fully addressed below in response to the Section 101 and 112 rejections.

Examiner Jagannathan also incorrectly stated during the Interview that the Schrodinger equation is already defined using Maxwell's equations and, thus, use of Maxwell's equations to solve the Schrodinger equation for the hydrogen atom is already well established. These allegations are completely without merit and fully addressed below in response to the Section 101 and 112 rejections.

Applicant also feels compelled to point out that withdrawal of Applicant's previously-allowed applications relating to lower-energy hydrogen and the hostility the PTO has exhibited toward Applicant in prosecuting those applications is not an isolated incident. During the same week of February 17, 2000, when Director Kepplinger was pulling Applicant's allowed applications from issuance, an unrelated application of Applicant's, U.S. Serial No. 09/220,970, directed to pattern recognition, was suspiciously transferred to a new Examiner, Bijan Tadayon, and summarily rejected.

Applicant's pattern recognition application had previously been reviewed by the

Section 101 panel of senior Examiners and deemed to contain allowable subject matter. Despite that fact, the new Examiner Tadayon rejected the application in a hostile manner alleging vague deficiencies under Section 101 and 112 similar to what was done in the subject application. Examiner Tadayon also admitted during an Interview that he was not the Examiner responsible for making the Section 101 rejection. Thus, it would appear that the use of "secret committees" to prosecute Applicant's applications behind the scenes is not confined to the subject application.[8]

In view of the unlawful actions of the PTO, reconsideration, allowance and immediate issuance of the subject application as a patent are respectfully requested.

* * *

Claims 1 - 299 are pending in the application.

In responding to the reintroduced rejections under Section 101 and 112, first paragraph, Applicant has spent an inordinate amount of time and expense compiling experimental data far beyond that required to demonstrate the utility and enablement of the claimed invention. In the interests of fairness, Applicant expects at the very least that the Examiner will fully evaluate the written description and all of the experimental evidence presented. If the Examiner disagrees with Applicant's interpretation of the supporting experimental evidence, he should provide a complete scientific basis for what he believes the experimental evidence shows, instead of making vague nonsensical remarks, such as those made regarding the spectroscopic data as only representing "a bunch of squiggly lines" that cannot be interpreted. The Examiner should also provide a legitimate basis, complete with full explanation, for any alleged inaccuracies in Applicant's extensive theories, in place of vague remarks about impossibilities and incredibilities, so that Applicant is afforded the opportunity to provide an adequate response. Mere conclusions by the Examiner that ambiguous physics,

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[8] A copy of the relevant parts of Applicant's Appeal Brief filed in the '970 application is attached, which further details the PTO's hostile behavior towards Applicant (Attachment 56).

mathematics and scientific laws are broken are insufficient, contrary to patent laws, and impose impossible barriers to allowance.

In short, Applicant is requesting only what he is due, that the Examiner conduct a fair, open and honest prosecution on the merits as required by the patent laws and rules of procedure.

**Section 101 Rejection**

The rejection of claims 1-299 under 35 U.S.C. § 101 is respectfully traversed. Applicant submits that the claimed invention fully complies with Section 101 for the following reasons.

Almost two years ago, the original Examiner raised a similar Section 101 rejection of the claims as being inoperative and lacking utility in the Office Action dated May 26, 1999. Applicant provided extensive, unbiased experimental evidence of real-world compounds that demonstrated the utility of the claimed invention and resulted in allowance of the Application.

The Examiner now completely ignores that evidence in resurrecting the rejection of claims 1-299 for lack of utility. Applicant respectfully submits that the Examiner has misapplied Section 101 and, for that reason alone, the Section 101 rejection should be withdrawn. The Patent Office procedures outlined in MPEP § 2107, p. 2100-31, mandates the following:

> [The Examiner] should not begin an evaluation of utility by assuming that an asserted utility is likely to be false, based on the technical field of the invention or for other general reasons. . . A conclusion that an asserted utility is incredible can be reached only after the Office has evaluated both the assertion of the applicant regarding utility and any evidentiary basis of that assertion. The [Examiner] should be particularly careful not to start with a presumption that an asserted utility is, *per se*, "incredible" and then proceed to base a rejection under 35 U.S.C. 101 on that presumption.

In applying the Section 101 rejection, the Examiner ignores this mandate and improperly presumes the invention to be *per se* incredible, while ignoring the extensive theoretical explanation and confirming experimental evidence disclosed in the

specification. The Examiner merely concludes without any basis that "[s]ince applicant's invention is based on a form of hydrogen, which according to conventionally accepted scientific principle cannot exist, the invention would be inoperative and thus lack utility." The Examiner has provided no reasonable explanation of how the extensive theory disclosed in the present specification is in error or why the supporting experimental evidence does not demonstrate the utility of what Applicant is claiming. The Examiner brushes over this extensive disclosure and substitutes his own views, which merely demonstrate his misunderstanding of conventional quantum theory. This failure to follow the Patent Office's own procedures in MPEP § 2107.01 alone mandates that the Section 101 rejection be withdrawn.

Notably, during the Feb. 21st Interview, when Applicant pressed Examiner Jagannathan as to what experimental evidence would be required to persuade him, he responded that he would only consider evidence that was "published" since unpublished experimental evidence was unreliable. He provided no assurances as to what evidence would be sufficient to obtain allowance.

The Examiner's requirement that Applicant's evidence be published has no legal basis whatsoever and, in effect, sets a new standard for patentability. This new standard further explains why the experimental evidence disclosed in the present specification and disclosed to original Examiners Kalafut and Langel was ignored in the pending Office Action. In effect, it appears that Examiner Jagannathan requires that Applicant's competitors, other scientists, must first approve of the claimed invention before allowance can once again even be considered.

This standard is clearly contrary to the established practice courts have laid out for applying Section 101 as summarized in MPEP § 2107.01:

> As a matter of Patent Office practice, a specification which contains a disclosure of utility which corresponds in scope to the subject matter sought to be patented must be taken as sufficient to satisfy the utility requirement of § 101 for the entire claimed subject matter unless there is a reason for one skilled in the art to question the objective truth of the statement of utility or its scope. *In re Langer*, 183 USPQ 288, 297 (CCPA 1974) (Emphasis added.)

Thus, the Patent Office must have adequate support for its challenge to the credibility of Applicant's statements as to utility. Only then does the burden shift to Applicant to provide rebuttal evidence. *In re Bundy*, 209 USPQ 48, 51 (CCPA 1981).

Since the Examiner did not properly consider Applicant's disclosure and supporting experimental evidence in making the Section 101 rejection and since the Examiner has made unfounded conclusions of incredibility, the burden has not yet shifted to Applicant. For these reasons alone, the Section 101 rejection should be withdrawn.

Even if the burden to demonstrate utility has shifted to Applicant, Applicant has provided more than sufficient disclosure of his theory and supporting evidence to meet that burden and demonstrate utility of claimed invention. The evidentiary standard to be used throughout the prosecution is a preponderance of the totality of the evidence with due consideration to persuasiveness of the arguments. *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). MPEP § 2107.01 sets forth the procedures for how this burden is to be met:

> To do this, Office personnel must provide evidence sufficient to show that the statement of asserted utility would be considered "false" by a person of ordinary skill in the art. Of course, a person of ordinary skill must have the benefit of both facts and reasoning in order to assess the truth of a statement. This means that if applicant has presented facts that support the reasoning used in asserting a utility, Office personnel must present countervailing facts and reasoning sufficient to establish that a person of ordinary skill would not believe the applicant's assertion of utility. *In re Brana*, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995). The initial evidentiary standard used during evaluation of this question is a preponderance of the evidence (i.e., the totality of the facts and reasoning suggest that it is more likely than not that the statement of the applicant is false) (Emphasis added.)

The Examiner has provided no countervailing facts and no credible reasoning that the claimed invention lacks utility. The Examiner only provides a postulated theory, namely the Schrodinger equation, to support his position. Those skilled in the

art know that the Schrodinger equation does not represent physical reality.[9] By definition, a postulated theory cannot take precedence over hard, real-world experimental evidence (described below and in the attached abstracts), especially when that theory does not even represent physical reality. Applicant has actually formulated numerous compounds containing the hydrinos (lower-energy hydrogen atoms), which have already been fully evaluated and resulted in the allowance of the application.

Ironically, on page 2 of the Office Action, the Examiner sets forth the following standard that was supposedly used to evaluate the utility of Applicant's invention:

> An asserted utility would not be considered credible where a person of ordinary skill in the art would consider the assertion to be incredible in view of contemporary knowledge and where the evidence offered by an applicant does not counter what contemporary knowledge otherwise suggests. (Emphasis added.)

The Examiner, however, pays mere "lip service" to this standard inasmuch as the extensive counter-evidence already submitted by Applicant has been wholly ignored. Indeed, the Office Action is conspicuously silent as to supposed deficiencies in the evidence or any other explanation of how that evidence fails to counter what the Examiner represents (or, in some cases, misrepresents) as "contemporary knowledge."

Similarly, Examiner Jagannathan summarily dismissed the evidence presented at the Interview for not being "published" and refused to articulate what evidence would be sufficient to convince him to once again allow the subject applications.

Instead of evaluating Applicant's evidence on the merits, the Examiner takes a "pot-shot" approach to the theory underlying Applicant's invention, demonstrating his misunderstanding of that theory in the process. For instance, the Examiner asserts his mistaken belief in the Office Action that "Schrodinger's wave equation mandates that the value "n" must be a positive integer (1, 2, 3, etc.)." Those skilled in the art, however, readily understand that the Schrodinger equation provides an infinite number

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[9] Well-known physicists Fuchs and Peres unambiguously acknowledged that "quantum theory does not represent physical reality." C.A. Fuchs and A. Peres,

of solutions, most of which are not even integers. Positive integer solutions are only obtained by arbitrarily defining a parameter in the Schrodinger equation. Thus, the Schrodinger equation was forced to fit experimental measurements of the hydrogen atom taken in the late 1800's by defining a constant in the equation. This "curve-fit" definition of the Schrodinger equation is not based on physics.

Clearly, the Examiner's elevation of a theory (Schrodinger equation), which was curve-fitted using late 1800-evidence, into a "law" that cannot be broken, while ignoring modern-day evidence that conclusively demonstrates the existence of lower-energy states is a misguided approach. This approach is contrary to established scientific methods of postulating a theory and then testing the accuracy of that theory. Applicant has advanced a sound theory that "n" can have fractional numbers and submitted extensive experimental evidence supporting that theory. The Examiner has failed to show otherwise.

The following summary of Applicant's theory and supporting experimental evidence demonstrates the credibility, utility and enablement of the novel claimed compounds and addresses the conclusions raised by the Examiner in the Section 101 and 112, first paragraph, rejections and those raised in the Examiner's Appendix. Applicant again points out that the Examiner's Appendix is directed solely to the Applicant's theory and excludes discussion of the extensive supporting experimental evidence. Since we all live in the real physical world, real-world experimental data must take precedence over theories, including those portions of quantum theory referred to in the Appendix. This is especially true when the quantum theory cited makes nonsensical, nonphysical predictions, such as non-causality, spooky actions at a distance, perpetual motion, infinities, violations of conservation of energy, virtual particles that are undetectable, an infinite cosmological constant, and negative energy states of the vacuum.

Moreover, the Examiner's comments and Appendix, which are based on the

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"Quantum Theory Needs No Interpretation," Physics Today, March (2000), p. 70 (Attachment 57).

electron being a point charge, do not directly address Applicant's theory, which is not based on the electron being a point charge. In other words, to use an analogy, the Applicant is claiming "apples" while the Examiner is attacking "oranges." Applicant requests that the Examiner compare "apples" to "apples" and, thus, address the claimed invention and not quantum theories unrelated to the claimed invention.

Even though a patent Applicant is not necessarily required to understand precisely how or why his invention works, Applicant provides the following additional information relating to his theory in order to provide further guidance to the Examiner:

- R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4).
- R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Il Nuovo Cimento, submitted (Attachment 5).
- R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).
- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).
- R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

Should the Examiner disagree with any part of Applicant's theory, Applicant requests that the Examiner provide specific reasons in support of his position, rather than making broad conclusory statements about violating various unidentified laws of science, physics and mathematics as previously alleged.

Applicant's claimed invention, and Applicant's theory, are supported by extensive experimental data disclosed in the original specification, as well as evidence provided herewith in Attachments 1 through 51, most of which was already considered by the Examiner in obtaining the first allowance of his applications. Since the amount of experimental evidence is voluminous, Applicant has only summarized some of those test results in this written Response. A more detailed summary is also included along with each attached test report.

To the extent that the Examiner disagrees with Applicant's interpretation of the experimental evidence, Applicant requests that he provide a complete explanation of what he believes the evidence demonstrates, along with any supporting scientific evidence of his own. Mere conclusions or nonsensical statements, such as those presented by Examiner Jagannathan at the Interview, that Applicant's spectroscopic data is "a bunch of squiggly lines" that cannot be interpreted, do nothing to advance the prosecution of the subject application.

- Recent analysis of mobility and spectroscopy data of individual electrons in liquid helium provide direct experimental confirmation that electrons can have the claimed fractional principal quantum energy levels.
  - R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

- The only pure elements that were observed to emit EUV are those in which the ionization of $t$ electrons from an atom to a continuum energy level is such that the sum of the ionization energies of the $t$ electrons is approximately $m \cdot 27.2 eV$ where $t$ and $m$ are each an integer. This evidence experimentally validates that the claimed catalyst is capable of accepting energy of a multiple of about 27.2 eV from hydrogen atoms.

- R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).
- R. Mills, N. Greenig, S. Hicks, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium, or Strontium Vapor", Int. J. Hydrogen Energy, submitted (Attachment 3).
- R. Mills and M. Nansteel, "Anomalous Argon-Hydrogen-Strontium Discharge", IEEE Transactions of Plasma Science, submitted (Attachment 6).
- R. Mills, M. Nansteel, and Y. Lu, "Anomalous Hydrogen-Strontium Discharge", European Journal of Physics D, submitted (Attachment 10).
- R. Mills, J. Dong, Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", Int. J. Hydrogen Energy, Vol. 25, (2000), pp. 919-943 (Attachment 11).
- R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).
- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).
- R. Mills, T. Onuma, and Y. Lu, "Formation of a Hydrogen Plasma from an Incandescently Heated Hydrogen-Catalyst Gas Mixture with an Anomalous Afterglow Duration", Int. J. Hydrogen Energy, in press (Attachment 14).
- R. Mills, M. Nansteel, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Strontium that Produced an Anomalous Optically Measured Power Balance", Int. J. Hydrogen Energy, in press (Attachment 15).

• Continuum state emission of $Cs^{2+}$ and $Ar^{2+}$ at $53.3\,nm$ and $45.6\,nm$, respectively, with the absence of the other corresponding Rydberg series of lines from these species confirmed the resonant nonradiative energy transfer of $27.2\,eV$ from atomic hydrogen to the catalysts atomic cesium or $Ar^{+}$. This evidence further experimentally validates that the claimed catalyst is capable of accepting energy of a multiple of about 27.2 eV from hydrogen atoms.

- R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).

• The predicted hydride ion of hydrogen catalysis by either cesium atom or $Ar^+$ catalyst is the hydride ion $H^-(1/2)$. This ion was observed spectroscopically at $407\,nm$ corresponding to its predicted binding energy of $3.05\,eV$. This evidence demonstrates the existence of the claimed hydride ion having a lower-energy hydrogen (hydrino).
  - R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).

• Transitions of atomic hydrogen to lower energy levels corresponding to lower-energy hydrogen atoms have been identified in the extreme ultraviolet emission spectrum from interstellar medium. This experimental evidence further demonstrates the existence of the claimed lower-energy hydrogen (hydrino).
  - R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).
  - R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, Chapter 40, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

• Lines observed at the Institut Fur Niedertemperatur-Plasmaphysik e.V. by EUV spectroscopy are assignable to transitions of atomic hydrogen to lower energy levels corresponding to lower-energy hydrogen atoms (hydrinos) and the emission from the excitation of the corresponding hydride ions. This experimental evidence further demonstrates the existence of the claimed lower-energy hydrogen (hydrino).
  - R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).

• Institut Fur Niedertemperatur-Plasmaphysik e.V. recorded an anomalous plasma formed with hydrogen-potassium mixtures. When the electric field was set to zero, the plasma

decayed with a two second half-life, matching the thermal decay time of the filament, which dissociated molecular hydrogen to atomic hydrogen. This experiment indicated that the emission was due to a reaction of Applicant's novel catalysts with atomic hydrogen, which confirms a new chemical source of power never before observed. The large amount of energy produced cannot be explained by conventional chemistry. This experimental evidence further demonstrates the operability of Applicant's invention.

- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).

• To test the electric dependence of the emission, the weak electric field of about 1 V/cm was set and measured to be zero in $< 0.5 X 10^{-6} sec$. An anomalous afterglow duration of about one to two seconds was recorded in the case of atoms and ions that ionize to provide a catalyst with a net enthalpy of reaction of an integer multiple of the potential energy of atomic hydrogen to within less than the thermal energies at $\approx 10^3 K$. Since the thermal decay time of the filament for dissociation of molecular hydrogen to atomic hydrogen was similar to the anomalous plasma afterglow duration, the emission was determined to be due to a reaction of atomic hydrogen with a catalyst that did not require the presence of an electric field to be functional. This experimental evidence further proves Applicant's claimed catalyst mechanism for producing lower-energy hydrogen.

- R. Mills, T. Onuma, and Y. Lu, "Formation of a Hydrogen Plasma from an Incandescently Heated Hydrogen-Catalyst Gas Mixture with an Anomalous Afterglow Duration", Int. J. Hydrogen Energy, in press (Attachment 14).
- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).

• Lyman series in the EUV represents an energy release 10X hydrogen combustion which is greater than that of any known chemical reaction. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.

- R. Mills, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", Int. J. Hydrogen Energy, submitted (Attachment 2).
- R. Mills, N. Greenig, S. Hicks, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium, or Strontium Vapor", Int. J. Hydrogen Energy, submitted (Attachment 3).
- R. Mills and M. Nansteel, "Anomalous Argon-Hydrogen-Strontium Discharge", IEEE Transactions of Plasma Science, submitted (Attachment 6).
- R. Mills, M. Nansteel, and Y. Lu, "Anomalous Hydrogen-Strontium Discharge", European Journal of Physics D, submitted (Attachment 10).
- R. Mills, J. Dong, Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", Int. J. Hydrogen Energy, Vol. 25, (2000), pp. 919-943 (Attachment 11).
- R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).
- R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K2CO3-H-Cell", Int. J. Hydrogen Energy, in press (Attachment 13).
- R. Mills, T. Onuma, and Y. Lu, "Formation of a Hydrogen Plasma from an Incandescently Heated Hydrogen-Catalyst Gas Mixture with an Anomalous Afterglow Duration", Int. J. Hydrogen Energy, in press (Attachment 14).
- R. Mills, M. Nansteel, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Strontium that Produced an Anomalous Optically Measured Power Balance", Int. J. Hydrogen Energy, in press (Attachment 15).

• Institut Fur Niedertemperatur-Plasmaphysik e.V. recorded line emission with a 4° Grazing Incidence EUV Spectrometer that was 100X more energetic than the combustion of hydrogen. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.

- R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, in press (Attachment 12).

• An energetic plasma in hydrogen was generated using strontium atoms as the catalyst. The plasma formed at 1% of the theoretical or prior known voltage requirement with 4,000-7,000 times less power input power compared to noncatalyst controls, sodium, magnesium, or barium atoms, wherein the plasma reaction was controlled with a weak electric field. The light output for power input increased to 8600 times that of the control when argon was added to the hydrogen strontium plasma. This experimental evidence demonstrates the operability of Applicant's novel catalysts compared to non-catalyst controls. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.

- R. Mills and M. Nansteel, "Anomalous Argon-Hydrogen-Strontium Discharge", IEEE Transactions of Plasma Science, submitted (Attachment 6).
- R. Mills, M. Nansteel, and Y. Lu, "Anomalous Hydrogen-Strontium Discharge", European Journal of Physics D, submitted (Attachment 10).
- R. Mills, M. Nansteel, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Strontium that Produced an Anomalous Optically Measured Power Balance", Int. J. Hydrogen Energy, in press (Attachment 15).

• The optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain catalysts in hydrogen gas or argon-hydrogen gas mixtures.

- R. Mills, N. Greening, S. Hicks, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium or Strontium Vapor," Int. J. Hydrogen Energy, submitted (Attachment 3).

• Energy balance measured by Pennsylvania State University that was 100X hydrogen combustion. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.

- Phillips, J., Smith, J., Kurtz, S., "Report On Calorimetric Investigations Of Gas-Phase Catalyzed Hydrino Formation" Final report for Period October-December 1996", January 1, 1997, A Confidential Report submitted to BlackLight Power, Inc. provided by BlackLight Power, Inc., Great Valley Corporate Center, 41 Great Valley Parkway, Malvern, PA 19355 (Attachment 34).

• Energy balance measured by a Setaram Differential Scanning Calorimeter which was 10X hydrogen combustion. This experimental evidence directly confirms the predicted energy release from hydrogen atoms using Applicant's novel catalysts according to Applicant's theory.
  - R. Mills, W. Good, A. Voigt, Jinquan Dong, "Minimum Heat of Formation of Potassium Iodo Hydride," Int. J. Hydrogen Energy, submitted. (Attachment 1)

• Novel hydrogen compounds containing lower-energy hydrogen have been isolated as products of the reaction of atomic hydrogen with Applicant's novel catalysts, which formed an anomalous plasma as reported in the EUV studies. This experimental evidence directly demonstrates the operability and utility of the claimed invention.
  - R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).
  - R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203 (Attachment 18).
  - R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, in press (Attachment 20).

• Novel hydride compounds containing lower-energy hydrogen were identified by 1) time of flight secondary ion mass spectroscopy which showed a dominant hydride ion in the negative ion spectrum; 2) X-ray photoelectron spectroscopy which showed novel hydride peaks and significant shifts of the core levels of the primary elements bound to the novel hydride ions; 3) $^1H$ nuclear magnetic resonance spectroscopy (NMR) which showed extraordinary upfield chemical shifts compared to the NMR of the corresponding ordinary

hydrides; and 4) thermal decomposition with analysis by gas chromatography, and mass spectroscopy which identified the compounds as hydrides. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).
- R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203 (Attachment 18).
- R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, in press (Attachment 20).
- R. Mills, "Novel Inorganic Hydride", Int. J. of Hydrogen Energy, Vol. 25, (2000), pp. 669-683 (Attachment 19).
- R. Mills, "Highly Stable Novel Inorganic Hydrides", Journal of Materials Research, submitted (Attachment 21).
- R. Mills, "Novel Hydrogen Compounds from a Potassium Carbonate Electrolytic Cell", Fusion Technology, Vol. 37, No. 2, March, (2000), pp. 157-182 (Attachment 22).

• The NMR results confirm the identification of novel hydride compounds $MH*X$ wherein $M$ is the metal, $X$, is a halide, and $H*$ comprises a novel high-binding energy hydride ion. Large distinct upfield resonances were observed at -4.5 ppm ($KH*Cl$), -4.1 ppm ($KH*Br$), -3.2 ppm ($KH*I$), -4.4 ppm ($RbH*F$), and -3.7 ppm ($RbH*I$). The presence of a halide in each compound $MH*X$ does not explain the upfield shifted NMR peak since the same NMR spectrum was observed for an equimolar mixture of the pure hydride and the corresponding alkali halide ($MH/MX$) as was observed for the pure hydride, $MH$. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- Gary L. Turner, Rule 132 Declaration. Dr. Turner has been conducting NMR scans for over twenty years and has not observed signals in the region of –4 to -5ppm other than Applicant's claimed compounds (Attachment 50).

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).
- R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203 (Attachment 18).
- R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, in press (Attachment 20).

• The synthesis of the novel hydride compounds $MH^*X$ wherein $M$ is the metal, $X$, is a halide, and $H^*$ comprises a novel high binding energy hydride ion, containing lower-energy hydrogen, having upfield shifted NMR peaks were readily repeatable. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).

• The NMR results of the identification of novel hydride compounds containing the lower-energy by large distinct upfield resonances was reproduced at Spectral Data Services, University of Massachusetts Amherst, University of Delaware, Grace Davison, and National Research Council of Canada. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).

• The NMR results further confirm the identification of novel hydride compounds $MH^*$ and $MH_2^*$ wherein $M$ is the metal and $H^*$ comprises a novel high binding energy hydride ion. Large distinct upfield resonances were observed at -2.8 ppm and -1.2 ppm in the case of $KH^*$ and $CaH_2^*$, respectively. Whereas, the resonances for the ordinary hydride ion of $KH$ were observed at 0.7 and 1.1 ppm, and the resonances for the ordinary hydride ion of

$CaH_2$ were observed at 1.2 ppm and 4.4 ppm. The synthesis of alkaline and alkaline earth hydrides, $KH^*$ and $CaH_2^*$, respectively, with upfield shifted peaks prove that the hydride ion containing the lower-energy hydrogen is different from the hydride ion of the corresponding known compound of the same composition. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy, Int. J. Hydrogen Energy, submitted (Attachment 7).

• Applicant has developed high-power-density, high-temperature, hydrogen gas cells that produce plasma, intense light, power of orders of magnitude greater than that of the combustion of hydrogen at high temperatures, and power densities equal to those of many electric power plants. The plasma is produced chemically by the reaction of atomic hydrogen with Applicant's novel catalysts. The plasma may be converted directly to electricity with high efficiency using a known microwave device called a gyrotron, thus, avoiding a heat engine such as a turbine. Applicant is working on direct plasma to electricity conversion. This experimental evidence directly demonstrates the operability and utility of the claimed invention.

- R. Mills, "BlackLight Power Technology-A New Clean Energy Source with the Potential for Direct Conversion to Electricity", Global Foundation International Conference on "Global Warming and Energy Policy", Dr. Behram N. Kursunoglu, Chairman, Fort Lauderdale, FL, November 26-28, 2000, in press (Attachment 8).

The above-described, extensive experimental evidence is more than sufficient to demonstrate the utility and enablement of the claimed invention and meets all legal standards. Applicant will now address specific comments made by the Examiner in the Office Action.

The Examiner argues that the Schrödinger equation only permits integer solutions starting at n=1. This is simply not correct. The Schrödinger equation permits a continuum of solutions which **must be arbitrarily defined** to produce integers starting with n=1 as shown in the articles discussed above. See "Schrödinger Theory of the Hydrogen Atom" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J.

Hydrogen Energy, in press (Attachment 9). In fact, an equally valid solution of the Schrödinger equation is the fractional states of the present invention, as shown in Schrödinger States Below n=1" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

The Examiner states that conventional quantum theory only permits integer states of hydrogen based on the Uncertainty Principle. In Endnote 5, the Examiner cites the Uncertainty Principle as a law of nature and cites Feynman that no one has found a way around it. This is simply incorrect. Durr et al. [S. Durr, T. Nonn, G. Rempe, Nature, September 3, (1998), Vol. 395, pp. 33-37 (Attachment 58)] have found a way around it, and the Uncertainty Principle was demonstrated experimentally to fail in a test of its long-touted basis of the wave particle duality. See "It has Been Shown Experimentally that the Heisenberg Uncertainty Principle Has Nothing to Do with Wave-Particle Duality" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, pp. 64-65 in press (Attachment 9), which states:

> Feynman states [117], " It is impossible to design an apparatus to determine which hole the electron passes through, that will not at the same time disturb the electrons enough to destroy the interference pattern." If an apparatus is capable of determining which hole the electron goes through, it *cannot* be so delicate that it does not disturb the pattern in an essential way. No one has ever found (or even thought of) away around the uncertainty principle. *So we must assume that it describes a basic characteristic of nature*."
>
> Feynman's position has recently been over turned by an experiment by Durr et al. [118]. According to Gerhard Rempe [119], who lead the Durr et al. experimental team, "*The Heisenberg uncertainty principle has nothing to do with wave-particle duality*." Durr et al. report [118], "We show that the back action onto the atomic momentum implied by Heisenberg's position-momentum uncertainty relation cannot explain the loss of interference."

In Endnote 5 the Examiner argues that n=1 is justified based on Feynman's argument that the momentum of the electron in the hydrogen atom can be determined from the Uncertainty Principle. This logic is flawed and further demonstrates the Examiner's lack of understanding of basic physics. The uncertainty in the momentum – not the momentum - may be determined from the Uncertainty Principle. Thus, there is no basis for the Examiner's broad conclusion that the momentum of the electron in the hydrogen atom can be determined from the Uncertainty Principle.

The Examiner's logic is further shown to be flawed in "The POSTULATED Schrödinger Equation Does Not Explain the Stability of the Hydrogen Atom" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 76-77 (Attachment 9), which states:

> Quantum theory does not say why an atom radiates. Quantum states of quantum theory refer to energy levels of probability waves. From these, emission and absorption of radiation is inferred. But quantum theory does not explain why it is emitted or absorbed or why certain states are stable. For example, the Schrödinger equation was postulated in 1926. It does not explain the stability of the hydrogen atom. To say that the atom obeys the Schrodinger equation is nonsensical. Consider the hydrogen atom without regard to the mathematical formula called the Schrodinger equation. Mathematics does not determine physics. It only models physics. The Schrodinger equation is not based on directly testable physical laws such as Maxwell's equations. It only gives correlations and is, in fact, inconsistent with physical laws.
>
> As a historical note:
> [My father] said, "I understand that they say that light is emitted from an atom when it goes from one state to another, from an excited state to a state of lower energy."
> I said, "That's right."
> "And light is kind of a particle, a photon, I think they call it."
> "Yes."
> "So if the photon comes out of the atom when it goes from the excited to the lower state, the photon must have been in the atom in the excited state."
> I said, "Well no."
> He said, "Well, how do you look at it so you can think of a particle photon coming out without it having been there in the excited state?"

> I thought a few minutes, and I said, "I'm sorry; I don't know. I can't explain it to you."
> -Richard P. Feynman, *The Physics Teacher* (September 1969).

As shown in the "Schrödinger States Below n=1" section, the definition of the "ground state" is mathematically purely arbitrary. It is always experimentally observed that the hydrogen atom does not spontaneously emit light once it has achieved an energy level of 13.6 eV. Thus, it is taught in textbooks that atomic hydrogen cannot go below this ground state. But, atomic hydrogen having an experimental ground state of 13.6 eV can only exist in a vacuum or in isolation, and atomic hydrogen cannot go below this ground state only when it is in isolation. Atomic hydrogen is extremely reactive, and there is no known composition of matter containing hydrogen in the ground state of 13.6 eV.

Since the Schrödinger equation offers no foundation for the stability of isolated atomic hydrogen, Feynman attempted to find a basis for the definition of the "ground state" in the Heisenberg Uncertainty Principle [137]. Feynman's based his derivation on the determination of the momentum as $p \approx h/a$ from the Uncertainty Principle, wherein he argues, "We need not trust our answer to within factors like 2, $\pi$, etc. We have not even defined $a$ very precisely." The kinetic energy follows classically from the momentum, and the electrostatic energy is given classically to give the total energy as

$$E = h^2/2ma^2 - e^2/a \tag{131}$$

Feynman determined the minimum energy in order to solve for the radius of the hydrogen atom.

$$dE/da = -h^2/ma^3 + e^2/a^2 = 0 \tag{132}$$

The result is exactly the Bohr radius.

The uncertainty principle [138] is

$$\sigma_x \sigma_p \geq \frac{\hbar}{2} \tag{133}$$

where $\sigma_x$ and $\sigma_p$ are given by

$$\sigma_x^2 = \int \psi^* \left(\hat{X} - \langle x \rangle\right)^2 \psi dx \tag{134}$$

$$\sigma_p^2 = \int \psi^* \left(\hat{P} - \langle p \rangle\right)^2 \psi dx \tag{135}$$

The definition of the momentum operator in a *one dimensional* system is [138]

$$\hat{P}_x = -i\hbar \frac{d}{dx} \tag{136}$$

and the position operator is

$$\hat{X} = x \quad (\text{multiply by x}) \tag{137}$$

Based on the Uncertainty Principle, Feynman's derivation of the Bohr radius is flawed on the basis of at least five points:

1) The Uncertainty Principle gives a lower limit to the product of the uncertainty in the momentum and the position - not the momentum and the position. The momentum or position could be arbitrarily larger or smaller than its uncertainty. For example, quantum mechanical textbooks express the movement of the electron, and the Heisenberg Uncertainty Principle is an expression of the statistical aspects of this movement. McQuarrie [15], gives the electron speed in the $n=1$ state of hydrogen as $2.18764 X 10^6 m/sec$. Remarkably, the uncertainty in the electron speed according to the uncertainty principle is $1.4 X 10^7 m/sec$ [16] which is an order of magnitude larger than the speed.

2) Feynman's derivation of the Bohr radius is internally inconsistent since the kinetic and electrostatic energies were derived classically; whereas, quantum mechanics and the uncertainty principle are not consistent with classical mechanics.

3) Feynman's derivation of the Bohr radius is internally inconsistent since the uncertainty principle requires uncertainty in the position and momentum. Yet, Eqs. (2.10-2.11) of Feynman (Eqs. (131-132)) can be solved to give an EXACT rather than a most probable electron position, momentum, and energy.

4) Feynman's derivation of the Bohr radius is flawed since Eq. (2.11) of Feynman (Eq. (132)) is nothing more than the Bohr force balance equation given by McQuarrie [139] and also derived by Mills [7]. Thus, this approach fails at explaining the stability of the 13.6 eV state beyond an arbitrary definition wherein "We need not trust our answer to within factors like 2, $\pi$, etc. [137]."

5) The faulty logic is compounded by the fact that the uncertainty principle is founded on the definition of the momentum operator given by Eq. (136) and the position operator given by Eq. (137). Thus, the Uncertainty Principle is based on the postulated Schrödinger equation and its associated postulates and descriptions of particles as probability waves. It is not based on physics. In fact, it is nonsensical in many physical, real-world tests, such as scattering of electrons from neutral atoms, confining electrons to atoms, confining electrons to atoms in excited states, wherein a photon causing a transition carries $\hbar$ of angular momentum, and the cosmological consequences of the uncertainty principle as described previously. Also, it is disproved experimentally that it provides a basis for the wave-particle duality nature of light and particles; even though, the opposite is widely touted as discussed

in the "It has Been Shown Experimentally that the Heisenberg Uncertainty Principle Has Nothing to Do with Wave-Particle Duality" section.

According to the generally accepted Born interpretation of the meaning of the wavefunction, the probability of finding the electron between $r,\theta,\phi$ and $r+dr,\theta+d\theta,\phi+d\phi$ is given by Eq. (130). The electron is viewed as a discrete particle that moves here and there (from $r=0$ to $r=\infty$), and $\Psi\Psi^*$ gives the time average of this motion. The Schrödinger equation possesses terms corresponding to the electron radial and angular kinetic energy which sum with the potential energy to give the total energy. These are necessary conditions for an electron bound by a central field [11]. Herman Haus derived a test of radiation based on Maxwell's equations [18]. Applying Haus's theorem to the point particle that must have radial kinetic energy demonstrates that the Schrödinger solution for the $n=1$ state of hydrogen is radiative; thus, it violates Maxwell's equations. Since none is observed for the $n=1$ state, QM is inconsistent with observation. The derivation is shown in the " Schrödinger Wave Functions in Violation of Maxwell's Equations" section of Mills [140].

In contrast, Applicant's theory is derived from Maxwell's equation with the constraint that the $n=1$ state is nonradiative. This approach leads to the prediction of stable states below the traditional $n=1$ state. Corresponding states are confirmed by the data on the free electrons in superfluid helium and other experimental test results described above.

In addition, the Uncertainty Principle is experimentally disproved since it predicts nonlocality, noncausality, spooky actions at a distance, and perpetual motion. See the "The Heisenberg Uncertainty Principle Predicts Nonlocality, Noncausality, Spooky Actions at a Distance, and Perpetual Motion which can be Shown to be Experimentally Incorrect" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

The Uncertainty Principle is experimentally disproved since it predicts an essentially infinite cosmological constant as given in the "Quantum Electrodynamics is Purely Mathematical and Has No Basis in Reality" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 55-56 (Attachment 9), which states:

> The Rutherford experiment demonstrated that even atoms are comprised of essentially empty space [95]. Zero-point field fluctuations,

> virtual particles, and states of negative energy and mass invoked to describe the vacuum are nonsensical and have no basis in reality since they have never been observed experimentally and would correspond to an essentially infinite cosmological constant throughout the entire universe including regions of no mass. As given by Waldrop [96], "What makes this problem into something more than metaphysics is that the cosmological constant is observationally zero to a very high degree of accuracy. And yet, ordinary quantum field theory predicts that it ought to be enormous, about 120 orders of magnitude larger than the best observational limit. Moreover, this prediction is almost inescapable because it is a straightforward application of the Uncertainty Principle, which in this case states that every quantum field contains a certain, irreducible amount of energy even in empty space. Electrons, photons, quarks--the quantum field of every particle contributes. And that energy is exactly equivalent to the kind of pressure described by the cosmological constant. The cosmological constant has accordingly been an embarrassment and a frustration to every physicist who has ever grappled with it."

In view of the lack of any facts or evidence provided by the Examiner, the Examiner's flawed statements regarding the postulated theory embodied in the Schrodinger Equation, and the extensive reasoning (theory) and supporting experimental evidence provided by Applicant, Applicant submits that the preponderance of evidence weighs strongly in favor of his meeting the utility requirements of Section 101. Accordingly, withdrawal of the reintroduced Section 101 rejection is respectfully requested.

**Section 112, First Paragraph, Rejection**

The rejection of claims 1-299 under 35 U.S.C. § 112, first paragraph, is respectfully traversed. Applicant submits that all claims 1-299 fully comply with Section 112, first paragraph, for the following reasons.

Almost two years ago, the Examiner raised a Section 112, first paragraph, rejection of the claims as containing subject matter that was not described in the specification in such as way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. [Office Action dated May 26, 1999]. In response, Applicant provided extensive experimental

evidence of real-world compounds that he produced, thereby demonstrating the enablement of the claimed invention and resulting in allowance of the Application.

Applicant, having previously satisfied the legal requirements of Section 112, first paragraph, as defined by the courts, is now being forced to meet an entirely new standard for enablement created by the Examiner. According to the Examiner, it is no longer sufficient to merely provide a description that enables one skilled in the art to practice the claimed invention. Now, in the Examiner's own words, "in order to establish enablement, applicant bears the burden of proving the accepted scientific law wrong or incomplete" [Office Action at page 6].

This new standard has no basis in any patent law or rule of procedure. In fact, this new standard is contrary to established case law, which provides that the Applicant need not even know how or why his invention works and, therefore, no theory of the invention need be disclosed. *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428, 435-36 (1911); *In re Isaacs and Lindenmann*, 146 USPQ 193, 197 (CCPA 1965); *Tapco Prods. Co. v. Van Mark Prods. Corp.,* 170 USPQ 550 (6th Cir. 1971). Thus, Applicant has gone far beyond what the patent laws require in providing a detailed theory of how and why his invention works, as well as extensive supporting experimental data.

Moreover, this new standard imposed by the Examiner is impossible to meet since he has failed to identify any scientific law that Applicant must prove wrong. Applicant respectfully submits that the Examiner is constructing new standards of patentability that, in effect, raise the bar so high as to constitute an impenetrable barrier to allowance of the subject application.

For instance, the Examiner's conclusion that the "nature of invention is that it is based on forms of hydrogen which cannot exist under the accepted laws of physics and mathematics" is completely groundless. Again, the Examiner simply makes conclusory statements without identifying any law of physics or mathematics that has been violated, and without providing any cogent analysis of such violation. Similarly, the Examiner's conclusions that undue experimentation would be required are without basis.

(1) The Quantity of Experimental Necessary

The Examiner states that the product of the electrolysis of an aqueous potassium carbonate electrolyte is potassium hydroxide. As conclusively shown in Mills publications [R. Mills, "Novel Inorganic Hydride", Int. J. of Hydrogen Energy, Vol. 25, (2000), pp. 669-683 (Attachment 19); R. Mills, "Highly Stable Novel Inorganic Hydrides", Journal of Materials Research, submitted (Attachment 21); R. Mills, "Novel Hydrogen Compounds from a Potassium Carbonate Electrolytic Cell", Fusion Technology, Vol. 37, No. 2, March, (2000), pp. 157-182 (Attachment 22)] a novel inorganic hydride compound $KH\ KHCO_3$ which is stable in water and comprises a high binding energy hydride ion containing lower-energy hydrogen was isolated following the electrolysis of a $K_2CO_3$ electrolyte. Inorganic hydride clusters $K[KH\ KHCO_3]_n^+$ were identified by Time of Flight Secondary Ion Mass Spectroscopy. Moreover, the existence of a novel hydride ion has been determined using X-ray photoelectron spectroscopy, and proton nuclear magnetic resonance spectroscopy.

These test procedures are sophisticated and were conducted by highly-trained technicians. It is improper for the Examiner to ignore this test data simply because he believes, as Examiner Jagannathan stated during the Interview, that the data represents "a bunch of squiggly lines" and is, therefore, incapable of being interpreted.

Applicant also finds it difficult to believe that the Examiner (as well as the numerous Examiners, Supervisors and Directors making up the "secret committee" actually prosecuting this application) missed the extensive synthesis, purification, and analysis disclosure outlined in the Table of Contents. Pages 1-2 of the present specification clearly states:

EXPERIMENTAL

Identification of Hydrinos, Dihydrinos, and Hydrino Hydride Ions by XPS (X-ray Photoelectron Spectroscopy)

A. Experimental Method of Hydrino Atom and Dihydrino Molecule XPS
B. Results and Discussion
C. Experimental Method of Hydrino Hydride XPS
    a. Carbon Electrode Samples
    b. Crystal Samples from an Electrolytic Cell

B. Results and Discussion

The specification is enabling not only for electrolytic reactors. The Specification teaches other fully operative methods of practicing the invention:

Electrolytic Cell Hydride Reactor
Gas Cell Hydride Reactor
Gas Discharge Cell Hydride Reactor
Plasma Torch Cell Hydride Reactor
Hydrino Hydride Purification
Identification of Increased Binding Energy Hydrogen Compounds

The specification teaches an extraordinary number of specific novel chemical formulas that are representative compounds of the claimed invention. Extensive experimental examples and experimental analyses are provided. At each section below, experimental examples are provided having novel peaks with identifying assignments that correspond to and identify hydrino hydride compounds according to the present invention:

EXPERIMENTAL

Identification of Hydrinos, Dihydrinos, and Hydrino Hydride Ions by XPS (X-ray Photoelectron Spectroscopy)

A. Experimental Method of Hydrino Atom and Dihydrino Molecule XPS

-Electrode sample from an electrolytic cell which shows hydrino compounds by XPS.

B. Results and Discussion

C. Experimental Method of Hydrino Hydride XPS

a. Carbon Electrode Samples

-Electrode sample from an electrolytic cell which shows hydrino compounds by XPS.

b. Crystal Samples from an Electrolytic Cell

-Crystalline sample purified from an electrolytic cell which shows hydrino by XPS.
-Acidified and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by XPS.

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by XPS.

D. Results and Discussion

Identification of Hydrino Hydride Compounds by Mass Spectroscopy

A. Sample Collection and Preparation

a. Electrolytic Sample

-Lithium ion added, acidified, and recrystallized crystalline sample purified from an electrolytic cell which shows hydrino compounds by mass spectroscopy.

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by mass spectroscopy.

b. Gas Cell Sample

-Three samples prepared with different embodiments of the gas cell which show hydrino compounds by mass spectroscopy.

c. Gas Discharge Cell Sample

-Sample prepared with the gas discharge cell which shows hydrino compounds by mass spectroscopy.

d. Plasma Torch Sample

-Sample prepared with the plasma torch cell which shows hydrino compounds by mass spectroscopy.

B. Mass Spectroscopy

C. Results and Discussion

Identification of Hydrino Hydride Compounds by XRD

(X-ray Diffraction Spectroscopy)

A. Experimental Methods

a. Spillover Catalyst Sample

-Sample prepared with the gas cell using a spillover catalysts which shows hydrino compounds by XRD.

b. Electrolytic Cell Samples

-Two samples from the cathode of an electrolytic cell which shows hydrino compounds by XRD.

-Two samples from acidification and recrystallization of crystalline samples purified from an electrolytic cell which shows hydrino compounds by XRD.

-Crystalline sample purified from an electrolytic cell which shows hydrino compounds by XRD.

c. Gas Cell Sample

-Sample prepared with the gas cell which shows hydrino compounds by XRD.

B. Results and Discussion

Identification of Hydrino Hydride Compounds and Dihydrino by Gas Chromatography with Calorimetry of the Decomposition of Hydrino Hydride Compounds

A. Gas Chromatography Methods

a. Control Sample

b. Plasma Torch Sample

-Sample prepared with the plasma torch cell which shows hydrino compounds by gas chromatography following thermal decomposition and an abnormal K/I ratio determined by XPS.

c. Coated Cathode Sample

-Sample prepared from the cathode wire of an electrolytic cell which showed hydrino compounds by gas chromatography following thermal decomposition.

d. Gas Discharge Cell Sample

-Sample prepared from an on-line gas discharge cell which showed dihydrino by gas chromatography.

B. Adiabatic Calorimetry Methods

-Eight samples prepared from the cathode wire of an electrolytic cell which showed hydrino compounds by the large enthalpy of decomposition by adiabatic calorimetry.

C. Enthalpy of the Decomposition Reaction of Hydrino Hydride Compounds and Gas Chromatography Results and Discussion

a. Enthalpy Measurement Results

b.2 Gas Chromatography Results

D. Discussion

Identification of Hydrino, Hydrino Hydride Compounds, and Dihydrino Molecular Ion Formation by Extreme Ultraviolet Spectroscopy

A. Experimental Methods

B. Results and Discussion

-Hydrino compounds were identified by EUV spectroscopy on three embodiments of the gas discharge cell and by on-line mas spectroscopy.

Despite all of this extensive experimental evidence, the Examiner provides only conclusory, misguided statements such as the following:

> Even if this procedure results in a compound having potassium and the "increased binding energy" hydrogen, this would only enable this compound, and not the numerous others encompassed by the present claims. How these other compounds are obtained would require numerous experiments far in excess of the electrolysis presented on pages 65-68. The specification must teach a person having ordinary skill in the art how to make and use the invention, not merely how the applicant may find out and use the invention himself, *in re Garnder*, 1[6]6 USPQ 138, 141 (CCPA 1970).

Incredibly, the Examiner ignores over 30 different experimental examples in the 126-page specification and focuses on only three pages and one example, the $K_2CO_3$ electrolytic cell, to support his conclusions. A fair review of the extensive experimental evidence of record, which includes 33 working and reproducible examples disclosed in the present specification, clearly demonstrates to one skilled in the art how to make the claimed

compounds without undue experimentation. For this reason alone, the Section 112 rejection should be withdrawn.

Furthermore, no experimental evidence is even required to demonstrate enablement. Enablement may be shown by the written description, which the Examiner also has ignored in concluding that the disclosure is nonenabling. *In re Fisher,* 166 USPQ 18, 24 (CCPA 1970); *In re Marzochhi and Horton*, 169 USPQ 367 (CCPA 1971).

Since the Examiner has only considered one example out of the many disclosed and has not considered the full written description, he has not made a prima facie case of nonenablement and the burden to prove otherwise has not shifted to the Applicant. For these reasons alone, the Section 112 rejection should be withdrawn.

(2) The Amount of Direction or Guidance Presented in the Specification

Again, the Examiner only relies on one out of over 30 disclosed examples to support his conclusion. Moreover, the Examiner did not even fully consider the one example he did select. The Examiner merely states that KOH is produced without considering the spectroscopic data disclosed in the Figs. 15, 17, 19, 21 and 37 of the present application. That data conclusively demonstrates that the sample is not ordinary KOH, but rather a novel compound containing lower-energy hydrogen. Apparently, the Examiner has once again improperly presumed that the spectroscopic data is merely "a bunch of squiggly lines" that cannot be interpreted.

The extensive disclosure provided enables one skilled in the art to practice the invention. All such a person would have to do is follow any one of the 33 reproducible examples provided in the present specification or follow the written description.

(3) The Presence or Absence of Working Examples

The Examiner states that "[i]t is unclear, however, whether applicant has actually formed and identified the various recited species, since the examples are directed to the electrolysis of aqueous $K_2CO_3$, which would, as stated above produce $KOH$ and $CO_2$. The present examples are thus not considered to be working examples." Remarkably, the

Examiner again excludes the extensive synthesis, purification, and analysis disclosure outlined in the Table of Contents and disclosed in the specification, discussed in Section (1) above.

The Examiner is simply wrong in concluding that ordinary KOH is produced. The specification discloses spectroscopic analysis demonstrating that lower-energy hydrogen is produced. Once again, the Examiner does not state how Applicant's interpretation of this experimental data is flawed. For this reason alone, the Section 112 rejection should be withdrawn.

(4) The Nature of the Invention

The Examiner, in effect, has constructed a impenetrable barrier to patentability. The Examiner states "in order to establish enablement, the applicant bears the burden of proving accepted scientific laws wrong or incomplete," yet fails to identify any scientific law that Applicant's invention has violated.

Contrary to the Examiner's belief, the Schrödinger equation is not a law of nature. The Schrodinger equation cannot be directly tested, and is nonphysical. Even competent quantum theory aficionados do not believe that quantum theory describes physical reality. Fuchs and Peres, state "Contrary to those desires, quantum theory does NOT describe physical reality." [C. A. Fuchs and A. Peres, "Quantum Theory Needs No "Interpretation", Physics Today, March (2000), p. 70].

Quantum states of quantum theory refer to energy levels of probability waves. From these, emission and absorption of radiation is inferred. However, quantum theory does not explain why it is emitted or absorbed or why certain states are stable. The Schrödinger equation was postulated in 1926. Schrödinger realized that his equation was limited. It is not Lorentzian invariant; thus, it violates special relativity. It also does not comply with Maxwell's equations and other first principle laws, which are properly characterized as scientific laws.

Schrödinger sought a resolution of the incompatibility with special relativity for the rest of his life. He was deeply troubled by the physical consequences of his equation

and its solutions. His hope was that the resolution would make his equation fully compatible with classical physics and the quantization would arise from first principles.

Quantum theory failed to predict the results of the Stern-Gerlach experiment which indicated the need for an additional quantum number. Quantum electrodynamics was proposed by Dirac in 1926 to provide a generalization of quantum mechanics for high energies in conformity with the theory of special relativity and to provide a consistent treatment of the interaction of matter with radiation. From Weisskopf [Weisskopf, V. F., Reviews of Modern Physics, Vol. 21, No. 2, (1949), pp. 305-315 (Attachment 59)], "Dirac's quantum electrodynamics gave a more consistent derivation of the results of the correspondence principle, but it also brought about a number of new and serious difficulties." These difficulties are discussed below and by R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).

The Examiner states in Endnote 4 that the Schrödinger equation and Dirac equation can be tested experimentally to an astounding degree of accuracy. In addition, in the Appendix, page 5, the Examiner states, "Furthermore, Mills theory does not show that the conventional quantum mechanical treatment of the hydrogen atom is theoretically or experimentally flawed." The Examiner is wrong on both counts.

Both equations are shown by Mills to be fatally flawed based on many very accurate experimental tests. For example, neither equation is based on first principles, they are internally inconsistent, and are directly disproved by many experiments, such as scattering experiments, mobility of free electrons in superfluid helium, tests of ions in Penning traps, etc. The many experimentally measured failings of both equations are given in R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9); R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23); and Chapters 35-38 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000

Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

For example, the experimental failures of the Schrödinger Equation are presented in "The POSTULATED Schrödinger Equation Fails to Solve the Hydrogen Atom Correctly" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 11-14 (Attachment 9), which states:

> The paper by Mills [7] rigorously analyzes the Schrödinger equation. One of many possible solutions of the postulated Schrödinger equation gives the Rydberg levels as does the theory of Bohr. On this basis alone, it is justified despite its inconsistency with physical laws and numerous experimental observations such as:
>
> • The appropriate eigenvalue must be postulated and the variables of the Laguerre differential equation must be defined as integers in order to obtain the Rydberg formula.
>
> • The Schrödinger equation is not Lorentzian invariant.
>
> • The Schrödinger equation violates first principles including special relativity and Maxwell's equations.
>
> • The Schrödinger equation gives no basis why excited states are radiative and the 13.6 eV state is stable. Mathematics does not determine physics. It only models physics.
>
> • In the time independent Schrödinger equation, the kinetic energy of rotation $K_{rot}$ is given by Eq. (10) where the value of the electron angular momentum $L$ for the state $Y_{lm}(\theta,\phi)$ is given by Eq. (11). The Schrödinger equation solutions, Eq. (10) and Eq. (11), predict that the ground state electron has zero angular energy and zero angular momentum, respectively.
>
> • The Schrödinger equation solution, Eq. (11), predicts that the ionized electron may have infinite angular momentum.
>
> • The Schrödinger equation solutions, Eq. (10) and Eq. (11), predict that the excited state rotational energy levels are nondegenerate as a function of the $\ell$ quantum number, even in the absence of an applied magnetic field, and the predicted energy is over six orders of magnitude of

the observed nondegenerate energy in the presence of a magnetic field. In the absence of a magnetic field, no preferred direction exists. In this case, the $\ell$ quantum number is a function of the orientation of the atom with respect to an arbitrary coordinate system. Therefore, the nondegeneracy is nonsensical and violates conservation of angular momentum of the photon.

• The Schrödinger equation predicts that each of the functions that corresponds to a highly excited state electron is not integrable and can not be normalized; thus, each is infinite.

• The Schrödinger equation predicts that the ionized electron is sinusoidal over all space and can not be normalized; thus, it is infinite.

• The Heisenberg Uncertainty Principle arises as the standard deviation in the electron probability wave, but experimentally it is not the basis of wave particle duality as shown in the Appendix.

• Quantum mechanical textbooks express the movement of the electron, and the Heisenberg Uncertainty Principle is an expression of the statistical aspects of this movement. McQuarrie [15], gives the electron speed in the $n = 1$ state of hydrogen as $2.18764\ X10^{6}\ m/\sec$. Remarkably, the uncertainty in the electron speed according to the uncertainty principle is $1.4\ X10^{7}\ m/\sec$ [16] which is an order of magnitude larger than the actual speed.

• Experimentally the electron has precise velocity, kinetic energy, and angular momentum. Acquiring these exact properties instantaneously defies all known physical principles.

• The correspondence principle does not hold experimentally.

• The Schrödinger equation does not predict the electron magnetic moment and misses the spin quantum number all together.

• The Schrödinger equation is not a wave equation since it gives the velocity squared proportional to the frequency.

• The Schrödinger equation is not consistent with conservation of energy in an inverse potential field, wherein the binding energy is equal to the kinetic energy and the sum of the binding energy and the kinetic energy is equal to the potential energy.

• The Schrödinger equation permits the electron to exist in the nucleus, which is a state that is physically nonsensical with infinite potential energy and infinite negative kinetic energy.

• The Schrödinger equation interpreted as a probability wave of a point particle can not explain neutral scattering of electrons from hydrogen.

• The Schrödinger equation interpreted as a probability wave of a point particle gives rise to infinite magnetic and electric energy in the corresponding fields of the electron.

• A modification of the Schrödinger equation was developed by Dirac to explain spin, which relies on the unfounded notions of negative energy states of the vacuum, virtual particles, and gamma factors.

The success of quantum mechanics can be attributed to 1.) the lack of rigor and unlimited tolerance to ad hoc assumptions in violation of physical laws, 2.) fantastical experimentally immeasurable corrections, such as virtual particles, vacuum polarizations, effective nuclear charge, shielding, ionic character, compactified dimensions, and renormalization, and 3.) curve fitting parameters that are justified solely on the basis that they force the theory to match the data. Quantum theory is now in a state of crisis with constantly modified versions of matter represented as undetectable minuscule vibrating strings that exist in many unobservable hyperdimensions, that can travel back and forth between undetectable interconnected parallel universes. (An analysis of the many failings of quantum mechanics are given in the Appendix.) And, recent data shows that the expansion of the universe is accelerating. This observation has shattered the long-held unquestionable doctrine of the origin of the universe as a big bang [17]. It may be time to reconsider the roots of quantum theory, namely the theory of the hydrogen atom, is long overdue, especially in light of the observation of real electron bubbles in helium, which require that the electron is divisible in order for the Schrödinger equation to explain the increase in conductivity upon irradiation with low energy light. This argument is reinforced by the demonstration that the electron in atoms, the free electron, and the free electron in superfluid helium can be solved physically [according to the Applicant's theory] rather than mathematically in closed form equations from first principles. [Applicant's] predictions match the observations without requiring that the electron is a probability wave or is divisible [into smaller parts].

The Examiner reliance on the Dirac equation as precluding the claimed invention is unfounded. The Dirac equation violates conservation of energy and causality and presents many predictions that are not representative of physical reality. Some of the many failures of the Dirac equation are disclosed in the "Quantum Electrodynamics is Purely Mathematical and Has No Basis in Reality" section of R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 54-55 (Attachment 9), which states:

> Quantum theory fails to predict the results of the Stern-Gerlach experiment, which indicated the need for an additional quantum number. Quantum electrodynamics was proposed by Dirac in 1926 to provide a generalization of quantum mechanics for high energies in conformity with the theory of special relativity and to provide a consistent treatment of the interaction of matter with radiation. From Weisskopf [90], "Dirac's quantum electrodynamics gave a more consistent derivation of the results of the correspondence principle, but it also brought about a number of new and serious difficulties." Quantum electrodynamics; 1) does not explain nonradiation of bound electrons; 2) contains an internal inconsistency with special relativity regarding the classical electron radius - the electron mass corresponding to its electric energy is infinite; 3) it admits solutions of negative rest mass and negative kinetic energy; 4) the interaction of the electron with the predicted zero-point field fluctuations leads to infinite kinetic energy and infinite electron mass; and 5) Dirac used the unacceptable states of negative mass for the description of the vacuum; yet, infinities still arise. In 1947, Lamb discovered a $1000\ MHz$ shift between the $^2S_{1/2}$ state and the $^2P_{1/2}$ state of the hydrogen atom. This so called Lamb Shift marked the beginning of modern quantum electrodynamics. In the words of Dirac [91], "No progress was made for 20 years. Then a development came initiated by Lamb's discovery and explanation of the Lamb Shift, which fundamentally changed the character of theoretical physics. It involved setting up rules for discarding ...infinities." Renormalization is presently believed to be required of any fundamental theory of physics [92]. However, dissatisfaction with renormalization has been expressed at various times by many physicists including Dirac [93] who felt that, "This is just not sensible mathematics. Sensible mathematics involves neglecting a quantity when it turns out to be small - not neglecting it just because it is infinitely great and you do not want it!"
>
> Furthermore, Oskar Klein pointed out a glaring paradox implied by the Dirac equation which was never resolved [94]. "Electrons may

penetrate an electrostatic barrier even when their kinetic energy, $E - mc^2$ is lower than the barrier. Since in Klein's example the barrier was infinitely broad this could not be associated with wave mechanical tunnel effect. It is truly a paradox: Electrons too slow to surpass the potential, may still only be partially reflected. ...Even for an infinitely high barrier, i.e. $r_2 = 1$ and energies $\approx 1\,MeV$, (the reflection coefficient) $R$ is less than 75%! From (2) and (3) it appears that as soon as the barrier is sufficiently high: $V > 2mc^2$, electrons may transgress the repulsive wall-seemingly defying conservation of energy. ...Nor is it possible by way of the positive energy spectrum of the free electron to achieve complete Einstein causality."

The Rutherford experiment demonstrated that even atoms are comprised of essentially empty space [95]. Zero-point field fluctuations, virtual particles, and states of negative energy and mass invoked to describe the vacuum are nonsensical and have no basis in reality since they have never been observed experimentally and would correspond to an essentially infinite cosmological constant throughout the entire universe including regions of no mass. As given by Waldrop [96], "What makes this problem into something more than metaphysics is that the cosmological constant is observationally zero to a very high degree of accuracy. And yet, ordinary quantum field theory predicts that it ought to be enormous, about 120 orders of magnitude larger than the best observational limit. Moreover, this prediction is almost inescapable because it is a straightforward application of the uncertainty principle, which in this case states that every quantum field contains a certain, irreducible amount of energy even in empty space. Electrons, photons, quarks--the quantum field of every particle contributes. And that energy is exactly equivalent to the kind of pressure described by the cosmological constant. The cosmological constant has accordingly been an embarrassment and a frustration to every physicist who has ever grappled with it."

The spin of the electron and the Lamb shift are calculated from first principles in closed form by Mills [2]. The spin angular momentum results from the motion of negatively charged mass moving systematically, and the equation for angular momentum, $\mathbf{r} \times \mathbf{p}$, can be applied directly to the wave function (a current density function) that describes the electron. The Lamb shift results from conservation of linear momentum of the photon.

The Examiner argues that according to quantum mechanics, the electron can not exist in the nucleus. At Endnote 1, the Examiner states, "Note that despite the finite value of the radial wavefunction at the nucleus, the probability of finding the electron in its normal ground

state is proportional to $4\pi\rho^2 S^2$ which, of course is zero." This is simply incorrect. According to the Standard Model, leptons are point particles, not baryons such as the proton and neutron. The proton has structure and is comprised of more fundamental particles--namely quarks and gluons. The proton has an experimentally measured radius of $r_p = 1.3\,X\,10^{-15}\,m$, not zero as alleged by the Examiner. Thus, $4\pi\rho^2 S^2$ is not zero.

According to quantum mechanics, the existence of the electron in the nucleus is the basis of spin-nuclear coupling called Fermi contact interaction [M. Karplus and R. N. Porter, *Atoms and Molecules an Introduction for Students of Physical Chemistry*, The Benjamin/Cummings Publishing Company, Menlo Park, California, (1970), p. 567 (Attachment 60)]. The spin-nuclear coupling energy is of the order of $10^{-24}\,J$ despite the infinite Coulombic energy of the electron when found in the nucleus (i.e. $r \to 0$ in the Schrödinger equation). This consequence of quantum mechanics is further flawed since this state is experimentally disproved. The nucleus does not contain electrons [Beiser, A., *Concepts of Modern Physics*, Fourth Edition, McGraw-Hill Book Company, New York, (1978), p. 407 (Attachment 61)].

In contrast, the spin nuclear energies are calculated by Applicant in closed form based on first principles without the requirement that the electron is in the nucleus. The calculations disclosed in Chapter 2 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16) are in close agreement with the experimental results, which states:

> The total energy of the transition from parallel to antiparallel alignment, $\Delta E_{total}^{S/N}$, is given as the sum of Eqs. (2.98) and (2.99).
>
> $$\Delta E_{total}^{S/N} = \frac{e^2}{8\pi\varepsilon_o}\left[\frac{1}{r_{1-}} - \frac{1}{r_{1+}}\right] - 2\mu_P \frac{\mu_0 e\hbar}{m_e a_H^3}\sqrt{\frac{3}{4}} \quad (2.100)$$
>
> $$\Delta E_{total}^{S/N} = 2.878\,X\,10^{-24}\,J - 3.837\,X\,10^{-24}\,J = -9.592\,X\,10^{-25}\,J \quad (2.101)$$
>
> The energy is expressed in terms of wavelength using the Planck relationship, Eq. (2.65).
>
> $$\lambda = \frac{hc}{\Delta E_{total}^{S/N}} = 21\ cm \quad (2.102)$$

The experimental value from astrophysical studies and from electron spin resonance measurements is $21\ cm$.

A further internal inconsistency exists regarding the Examiner's position stated as: "Note that despite the finite value of the radial wavefunction at the nucleus, the probability of finding the electron in its normal ground state is proportional to $4\pi\rho^2 S^2$ which, of course is zero." Since the electron has no volume, based on this logic, the probability that an electron can capture a photon to form an excited state is also zero. This internal inconsistency based on the description of the electron as a point particle probability wave does not arise in Applicant's theory.

In the February 21, 2001 interview, Examiner Jagannathan challenged Applicant's statement that Dirac's positive solution was first attributed to the proton and was only assigned to the positron after its discovery and this greatly qualifies the Examiner's position that the Dirac equation predicted the positron. Examiner Jagannathan requested that Applicant produce a literature citation for support. In response, Applicant provides a citation to Beiser, A., Concepts of Modern Physics, Fourth Edition, McGraw-Hill Book Company, New York, (1978), p. 527 (Attachment 61) wherein in the second paragraph appears, "An unexpected result of the Dirac theory was its prediction that positive as well as negative electrons should exist. At first it was thought that the proton was the positive counterpart of the electron despite the differences in their masses, but in 1932 a positive electron was unambiguously detected in the flux of cosmic radiation at the earth's surface." Applicant further stated that his theory not only predicts the positron unambiguously, but also predicts its mass. The electron and positron mass calculation appears in the "Lepton" section of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16). The calculation is also given in the invited paper: R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and

Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4), which states:

> **The Electron-Antielectron Lepton Pair**
> A clock is defined in terms of a self consistent system of units used to measure the particle mass. The proper time of the particle is equated with the coordinate time according to the Schwarzschild metric corresponding to light speed. The special relativistic condition corresponding to the Planck energy gives the mass of the electron.

$$2\pi\frac{\hbar}{mc^2}=\sec\sqrt{\frac{2Gm^2}{c\alpha^2\hbar}} \tag{19}$$

$$m_e=\left(\frac{h\alpha}{\sec c^2}\right)^{\frac{1}{2}}\left(\frac{c\hbar}{2G}\right)^{\frac{1}{4}}=9.1097\,X\,10^{-31}\ kg \tag{20}$$

$$m_e=9.1097\,X\,10^{-31}\ kg-18\ eV(\nu_e)=9.1094\,X\,10^{-31}\ kg \tag{21}$$

$$m_{e\ \text{experimental}}=9.1095\,X\,10^{-31}\ kg \tag{22}$$

In the Feb. 21st Interview, Examiner Jagannathan alleged that Applicant's application of a nonradiative boundary constraint to solve the wave equation for the current and charge density functions was well established. After repeated inquiry by Applicant of the exact equation to which the Examiner was referring, Examiner Jagannathan stated that the Dirac equation was fully compliant with Maxwell's equations. This statement is simply untrue. Applicant does not take lightly the Examiner's allegation that Applicant's theory is not novel after two years of exhaustive examination, without providing any basis.

In quantum theory, the spin angular momentum of the electron is called the "intrinsic angular momentum" since no physical interpretation exists. The Schrödinger equation is not Lorentzian invariant in violation of special relativity. The Schrodinger equation fails to predict the results of the Stern-Gerlach experiment which indicated the need for an additional quantum number. Quantum electrodynamics was proposed by Dirac in 1926 to provide a generalization of quantum mechanics for high energies in conformity with the theory of special relativity and to provide a consistent treatment of the interaction of matter with

radiation. It is fatally flawed. From Weisskopf [Weisskopf, V. F., Reviews of Modern Physics, Vol. 21, No. 2, (1949), pp. 305-315 (Attachment 59)], "Dirac's quantum electrodynamics gave a more consistent derivation of the results of the correspondence principle, but it also brought about a number of new and serious difficulties." Quantum electrodynamics: 1) does not explain nonradiation of bound electrons; 2) contains an internal inconsistency with special relativity regarding the classical electron radius - the electron mass corresponding to its electric energy is infinite (The Schrödinger equation fails to predict the classical electron radius); 3) it admits solutions of negative rest mass and negative kinetic energy; 4) the interaction of the electron with the predicted zero-point field fluctuations leads to infinite kinetic energy and infinite electron mass; and 5) Dirac used the unacceptable states of negative mass for the description of the vacuum; yet, infinities still arise. Dirac's equation, which was postulated to explain spin, relies on the unfounded notions of negative energy states of the vacuum, virtual particles, and gamma factors. All of these features are untenable or are inconsistent with observations. These problems regarding spin and orbital angular momentum and energies and the classical electron radius are nonexistent with Applicant's solutions [R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com; posted at www.blacklightpower.com (Attachment 16)].

Further flaws of the Schrödinger and Dirac equations are given in peer-reviewed journal articles of Applicant:

- R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).
- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).

In the Appendix, page 4, the Examiner states, "It is observed that the legitimate use of Green's function which satisfies an equation involving a Dirac delta function type of a **"point source"** (emphasis added) and appears, ultimately under an integral sign as the kernel of an integral equation, does not justify Mill's representation of the electron charge density, which is a "smeared out" charge distribution, as a Dirac delta function as discussed previously.

Applicant's solution for the electron is an **extended particle**--not a point source. The Examiner has completely missed the point of Applicant's derivation. The results of Applicant's theory is based on and demonstrates the proposition that classical physical laws describe reality on all scales. Unlike quantum theory, which postulates that different laws apply on the atomic level, the premise of Applicant's theory is that a valid theory must comply with ALL of the following:

- theory must be internally consistent even between widely different phenomena
- Maxwell's equations
- conservation of matter/energy
- conservation of linear and angular momentum
- charge conservation
- first and second law of thermodynamics
- Newton's law in the low speed limit; special relativity otherwise
- general relativity (e.g. Schwarzschild metric)--no cosmological constant; and Newtonian gravitation in the weak field limit (which demands no cosmological constant)
- a vacuum is a vacuum
- constant maximum of the speed of light in a vacuum
- 4 dimensional spacetime
- the only allowed parameters are the measured fundamental constants

A summary of Applicant's approach is provided in R. Mills, "The Nature of Free Electrons in Superfluid Helium - - a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory," Int. J. Hydrogen Energy, in press, pp. 20-22 (Attachment 9) as follows:

**Mills Theory-***a classical quantum theory*

One-electron atoms include the hydrogen atom, $He^+$, $Li^{2+}$, $Be^{3+}$, and so on. The mass-energy and angular momentum of the electron are constant; this requires that the equation of motion of the electron be temporally and spatially harmonic. Thus, the classical wave equation applies and

$$\left[\nabla^2 - \frac{1}{v^2}\frac{\delta^2}{\delta t^2}\right]\rho(r,\theta,\phi,t) = 0 \qquad (37)$$

where $\rho(r,\theta,\phi,t)$ is the charge density function of the electron in time and space. In general, the wave equation has an infinite number of solutions. To arrive at the solution which represents the electron, a suitable boundary condition must be imposed. It is well known from experiments that each single atomic electron of a given isotope radiates to the same stable state. Thus, Mills chose the physical boundary condition of nonradiation of the bound electron to be imposed on the solution of the wave equation for the charge density function of the electron. The condition for radiation by a moving point charge given by Haus [18] is that its spacetime Fourier transform does possess components that are synchronous with waves traveling at the speed of light. Conversely, it is proposed that the condition for nonradiation by an ensemble of moving point charges that comprises a charge density function is

*For non-radiative states, the current-density function must NOT possess spacetime Fourier components that are synchronous with waves traveling at the speed of light.*

The Haus derivation applies to a moving charge-density function as well because charge obeys superposition. The Haus derivation is summarized below.

The Fourier components of the current produced by the moving charge are derived. The electric field is found from the vector equation in Fourier space (**k**, w-space). The inverse Fourier transform is carried over the magnitude of $\mathbf{k}$. The resulting expression demonstrates that the radiation field is proportional to $\mathbf{J}_\perp(\frac{\omega}{c}\mathbf{n},\omega)$, where $\mathbf{J}_\perp(\mathbf{k},\omega)$ is the spacetime Fourier transform of the current perpendicular to $\mathbf{k}$ and $\mathbf{n} \equiv \frac{\mathbf{k}}{|k|}$. Specifically,

$$\mathbf{E}_\perp(\mathbf{r},\omega)\frac{d\omega}{2\pi} = \frac{c}{2\pi}\int\rho(\omega,\Omega)d\omega d\Omega\sqrt{\frac{\mu_0}{\varepsilon_0}}\mathbf{n}\,X\left(\mathbf{n}\,X\,\mathbf{J}_\perp\left(\frac{\omega}{c}\mathbf{n},\omega\right)e^{i\left(\frac{\omega}{c}\right)\mathbf{n}\bullet\mathbf{r}}\right) \qquad (38)$$

The field $\mathbf{E}_\perp(\mathbf{r},\omega)\frac{d\omega}{2\pi}$ is proportional to $\mathbf{J}_\perp\left(\frac{\omega}{c}\mathbf{n},\omega\right)$, namely, the Fourier component for which $\mathbf{k} = \frac{\omega}{c}$. Factors of $\omega$ that multiply the Fourier component of the current are due to the density of modes per unit volume and unit solid angle. An unaccelerated charge does not radiate in free

space, not because it experiences no acceleration, but because it has no Fourier component $\mathbf{J}_{\perp}\left(\frac{\omega}{c}\mathbf{n},\omega\right)$.

The time, radial, and angular solutions of the wave equation are separable. The motion is time harmonic with frequency $\omega_n$. To be a harmonic solution of the wave equation in spherical coordinates, the angular functions must be spherical harmonic functions. A zero of the spacetime Fourier transform of the product function of two spherical harmonic angular functions, a time harmonic function, and an unknown radial function is sought. The solution for the radial function which satisfies the boundary condition is a delta function

$$f(r)=\frac{1}{r^2}\delta(r-r_n) \tag{39}$$

where $r_n = nr_1$ is an allowed radius. Thus, bound electrons are described by a charge-density (mass-density) function which is the product of a radial delta function ($f(r)=\frac{1}{r^2}\delta(r-r_n)$), two angular functions (spherical harmonic functions), and a time harmonic function. Thus, an electron is a spinning, two-dimensional spherical surface, called an *electron orbitsphere*, that can exist in a bound state at only specified distances from the nucleus as shown in Figure 1. More explicitly, the orbitsphere comprises a two-dimensional spherical shell of moving charge.

The total function that describes the spinning motion of each electron orbitsphere is composed of two functions. One function, the spin function, is spatially uniform over the orbitsphere, spins with a quantized angular velocity, and gives rise to spin angular momentum. The other function, the modulation function, can be spatially uniform—in which case there is no orbital angular momentum and the magnetic moment of the electron orbitsphere is one Bohr magneton—or not spatially uniform—in which case there is orbital angular momentum. The modulation function also rotates with a quantized angular velocity.

The corresponding current pattern of the constant charge function of the orbitsphere corresponding to the spin function comprises an infinite series of correlated orthogonal great circle current loops. The current pattern is generated over the surface by two orthogonal sets of an infinite series of nested rotations of two orthogonal great circle current loops where the coordinate axes rotate with the two orthogonal great circles. Each infinitesimal rotation of the infinite series is about the new x-axis and new y-axis which results from the preceding such rotation. For each of the two sets of nested rotations, the angular sum of the rotations about each rotating x-axis and y-axis totals $\sqrt{2}\pi$ radians.

Some of the results are summarized in the following abstract of R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Il Nuovo Cimento, submitted (Attachment 5), which states:

> A theory of classical quantum mechanics (CQM), derived from first principles, successfully applies physical laws on all scales [1]. The classical wave equation is solved with the constraint that a bound electron cannot radiate energy. The mathematical formulation for zero radiation based on Maxwell's equations follows from a derivation by Haus [2]. The function that describes the motion of the electron must not possess spacetime Fourier components that are synchronous with waves traveling at the speed of light. CQM gives closed form solutions for the atom including the stability of the $n = 1$ state and the instability of the excited states, the equation of the photon and electron in excited states, the equation of the free electron, and photon which predict the wave particle duality behavior of particles and light. The current and charge density functions of the electron may be directly physically interpreted. For example, spin angular momentum results from the motion of negatively charged mass moving systematically, and the equation for angular momentum, $\mathbf{r} \times \mathbf{p}$, can be applied directly to the wave function (a current density function) that describes the electron. The magnetic moment of a Bohr magneton, Stern Gerlach experiment, g factor, Lamb shift, resonant line width and shape, selection rules, correspondence principle, wave particle duality, excited states, reduced mass, rotational energies, and momenta, orbital and spin splitting, spin-orbital coupling, Knight shift, and spin-nuclear coupling, ionization of two electron atoms, inelastic electron scattering from helium atoms, and the nature of the chemical bond are derived in closed form equations based on Maxwell's equations. The calculations agree with experimental observations.
>
> For any kind of wave advancing with limiting velocity and capable of transmitting signals, the equation of front propagation is the same as the equation for the front of a light wave. By applying this condition to electromagnetic and gravitational fields at particle production, the Schwarzschild metric (SM) is derived from the classical wave equation which modifies general relativity to include conservation of spacetime in addition to momentum and matter/energy. The result gives a natural relationship between Maxwell's equations, special relativity, and general relativity. It gives gravitation from the atom to the cosmos. The universe is time harmonically oscillatory in matter energy and spacetime expansion and contraction with a minimum radius that is the gravitational radius. In

closed form equations with fundamental constants only, CQM gives the deflection of light by stars, the precession of the perihelion of Mercury, the particle masses, the Hubble constant, the age of the universe, the observed acceleration of the expansion, the power of the universe, the power spectrum of the universe, the microwave background temperature, the uniformity of the microwave background radiation, the microkelvin spatial variation of the microwave background radiation, the observed violation of the GZK cutoff, the mass density, the large scale structure of the universe, and the identity of dark matter which matches the criteria for the structure of galaxies. In a special case wherein the gravitational potential energy density of a blackhole equals that of the Plank mass, matter converts to energy and spacetime expands with the release of a gamma ray burst. The singularity in the SM is eliminated.

For a further discussion of Applicant's theory, see:

-R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4).

- R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9).
- R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).
- R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

In the Appendix, page 4, the Examiner wrongly hypothesizes that Applicant's lower-energy states can not exist since "there is no explanation for the catastrophic collapse of the electron into the nucleus as $n \rightarrow \infty$ in the fractional number series, $1/n$, i. e. the hydrino atom implodes and ceases to exist." This is not true based on conservation of energy as disclosed in Chapter 5 of R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January

2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 5), as well as the earlier versions of Applicant's book, which are incorporated by reference into the subject application.

Applicant never stated or alleged that the hydrino atom implodes. The Examiner has it backwards. Applicant's theory does not result in the electron contacting the nucleus, whereas the Schrodinger equation cited by the Examiner actually requires that the electron must exist in the nucleus part of the time, as discussed above. These over simplistic arguments further demonstrate the Examiner's improper approach of taking Applicant's teachings out of context and making nonsensical conclusions.

Applicant's teachings clearly state the following:

**NEW "GROUND" STATE**

Hydrogen atoms can undergo transitions to energy states below the ground state [13.6 eV] until the total potential energy of the proton is converted to relativistically corrected kinetic energy and total energy (the negative of the binding energy). The potential energy $V$ of the electron and the proton separated by the radial distance radius $r_1$ is,

$$V = \frac{-e^2}{4\pi\varepsilon_o r_1} \tag{5.72}$$

where the radius $r_1$ is the proton radius given by Eq. (28.1)

$$r_p = 1.3\,X\,10^{-15}\,m \tag{5.73}$$

Substitution of Eq.(5.73) into Eq.(5.72) gives the total potential energy $V$ of the electron and the proton

$$V = \frac{-e^2}{4\pi\varepsilon_o r_p} = 1.1\ \mathrm{X}\ 10^6\ \mathrm{eV} \tag{5.74}$$

Thus, Applicant's theory clearly provides limits on how low of an energy state the electron can be taken using Applicant's novel nonradiative transfer of energy from the hydrogen atom. Applicant's theory does not state that the electron catastrophically collapses into the nucleus and the Examiner has no basis for making such an absurd allegation.

(5-7) State of the Prior Art, Relative Skill of Those in the Art, The Predictability or Unpredictability of the Art

It is well known that atomic hydrogen is extremely reactive, but is nonradiative and stable only in vacuum or in isolation. This experimental fact has been used by Applicant to solve the hydrogen atom in a new way based on physical laws including Maxwell's equations[10] rather that postulate a probability wave theory in contradiction to physical laws, as is the case with the Schrödinger equation and Dirac equation.[11]

Energy can also be transferred by nonradiative means, which is the basis of the formation of molecular hydrogen and the mechanisms of phosphors. The newly-discovered nonradiative energy transfer from hydrogen atoms to Applicant's novel catalysts is explained by Applicant in his patent application and in many of his publications discussed herein above. For example, in R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press, pp. 31-35 (Attachment 9), which states:

> **The Electron of Atomic Hydrogen Does Not Spontaneously Emit Radiation at the n=1 State, but that Does Not Preclude Radiationless Processes Including Formation of Molecular Hydrogen.**

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[10] See R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL, in press (Attachment 4); R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Il Nuovo Cimento, submitted (Attachment 5); R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9); R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23); R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com (Attachment 16).

[11] See R. Mills, The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, in press (Attachment 9); R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183 (Attachment 23).

The nonradiative state of atomic hydrogen which is historically called the "ground state" forms the basis of the boundary condition of Mills theory [63] to solve the wave equation. Mills further predicts [64] that certain atoms or ions serve as catalysts to release energy from hydrogen to produce an increased binding energy hydrogen atom called a *hydrino atom* having a binding energy of

$$Binding\ Energy = \frac{13.6\ eV}{n^2} \tag{69}$$

where

$$n = \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, ..., \frac{1}{p} \tag{70}$$

and $p$ is an integer greater than 1, designated as $H\left[\frac{a_H}{p}\right]$ where $a_H$ is the radius of the hydrogen atom. Hydrinos are predicted to form by reacting an ordinary hydrogen atom with a catalyst having a net enthalpy of reaction of about

$$m \cdot 27.2\ eV \tag{71}$$

where $m$ is an integer. This catalysis releases energy from the hydrogen atom with a commensurate decrease in size of the hydrogen atom, $r_n = na_H$. For example, the catalysis of $H(n=1)$ to $H(n=1/2)$ releases $40.8\ eV$, and the hydrogen radius decreases from $a_H$ to $\frac{1}{2}a_H$.

It is taught in textbooks that atomic hydrogen cannot go below the ground state of 13.6 eV. Atomic hydrogen having an experimental ground state of 13.6 eV can only exist in a vacuum or in isolation, and atomic hydrogen cannot go below this ground state in isolation. However, there is no known composition of matter containing hydrogen in the ground state of 13.6 eV. Atomic hydrogen is radical and is very reactive. It may react to form a hydride ion or compositions of matter. It is a chemical intermediate which may be trapped as many chemical intermediates may be by methods such as isolation or cryogenically. A hydrino atom may be considered a chemical intermediate that may be trapped in vacuum or isolation. A hydrino atom can form a hydride ion or a novel composition of matter. Hydrogen at predicted lower-energy levels, hydrino atoms, have been identified in the extreme ultraviolet emission spectrum from interstellar medium [7]. In addition, new compositions of matter containing hydrogen at predicted lower-energy levels have recently been observed in the laboratory [38, 40-58], which energy levels are achieved using the novel catalysts. Spectroscopic experiments confirm the catalysis of hydrogen [27-44].

The excited energy states of atomic hydrogen are also given by Eq. (69) except that

$$n = 1,2,3,... \quad (72)$$

The $n = 1$ state is the "ground" state for "pure" photon transitions (the $n = 1$ state can absorb a photon and go to an excited electronic state, but it cannot release a photon and go to a lower-energy electronic state). However, an electron transition from the ground state to a lower-energy state is possible by a nonradiative energy transfer such as multipole coupling or a resonant collision mechanism. These lower-energy states have fractional quantum numbers, $n = \frac{1}{\text{integer}}$. Processes that occur without photons and that require collisions are common. For example, the exothermic chemical reaction of $H + H$ to form $H_2$ does not occur with the emission of a photon. Rather, the reaction requires a collision with a third body, $M$, to remove the bond energy- $H + H + M \rightarrow H_2 + M^*$ [65]. The third body distributes the energy from the exothermic reaction, and the end result is the $H_2$ molecule and an increase in the temperature of the system. Some commercial phosphors are based on nonradiative energy transfer involving multipole coupling [66]. For example, the strong absorption strength of $Sb^{3+}$ ions along with the efficient nonradiative transfer of excitation from $Sb^{3+}$ to $Mn^{2+}$, are responsible for the strong manganese luminescence from phosphors containing these ions. Similarly, the $n = 1$ state of hydrogen and the $n = \frac{1}{\text{integer}}$ states of hydrogen are nonradiative, but a transition between two nonradiative states is possible via a nonradiative energy transfer, say $n = 1$ to $n = 1/2$. In these cases, during the transition the electron couples to another electron transition, electron transfer reaction, or inelastic scattering reaction which can absorb the exact amount of energy that must be removed from the hydrogen atom. Thus, a catalyst provides a net positive enthalpy of reaction of $m \cdot 27.2\ eV$ (i.e. it absorbs $m \cdot 27.2\ eV$ where $m$ is an integer). Certain atoms or ions serve as catalysts which resonantly accept energy from hydrogen atoms and release the energy to the surroundings to effect electronic transitions to fractional quantum energy levels.

Once formed hydrinos have a binding energy given by Eqs. (71-72); thus, they may serve as catalysts which provide a net enthalpy of reaction given by Eq. (71). Also, the simultaneous ionization of two hydrogen atoms may provide a net enthalpy given by Eq. (71). Since the surfaces of stars comprise significant amounts of atomic hydrogen, hydrinos may be formed as a source to interstellar space where further transitions may occur.

A number of experimental observations lead to the conclusion that atomic hydrogen can exist in fractional quantum states that are at lower

energies than the traditional "ground" ($n = 1$) state. For example, the existence of fractional quantum states of hydrogen atoms explains the spectral observations of the extreme ultraviolet background emission from interstellar space [67], which may characterize dark matter as demonstrated in Table 2 of Mills [7].

Laboratory experiments that confirm the novel hydrogen chemistry include extreme ultraviolet (EUV) spectroscopy [27, 29-32, 35-39, 42-44], plasma formation [27-39, 42-44], power generation [28-30, 35, 62], and analysis of chemical compounds [38, 42-58, 62]. For example, lines observed by EUV spectroscopy could be assigned to transitions of atomic hydrogen to lower energy levels corresponding to lower energy hydrogen atoms called hydrino atoms and the emission from the excitation of the corresponding hydride ions formed from the hydrino atoms [29]. The chemical interaction of catalysts with hydrogen at temperatures below 1000 K has shown surprising results in terms of the emission of the Lyman and Balmer lines [27-44] and the formation of novel chemical compounds [38, 40-58]. An energetic plasma in hydrogen was generated by a catalysis reaction at 1% of the theoretical or prior known voltage requirement and with 1000's of times less power input in a system wherein the plasma reaction is controlled with a weak electric field [29-30, 35]. The optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain of catalysts in hydrogen gas or argon-hydrogen gas mixtures [28]. A hydrogen plasma formed by reacting a catalyst with hydrogen was recorded when there was no electric energy input to the reaction [33-34]. The optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain of catalysts in hydrogen gas or argon-hydrogen gas mixtures [28]. Continuum state emission of $Cs^{2+}$ and $Ar^{2+}$ at $53.3\,nm$ and $45.6\,nm$, respectively, with the absence of the other corresponding Rydberg series of lines from these species confirmed the resonant nonradiative energy transfer of $27.2\,eV$ from atomic hydrogen to atomic cesium or $Ar^{+}$. The predicted hydride ion of hydrogen catalysis by either cesium atom or $Ar^{+}$ catalyst is the hydride ion $H^{-}(1/2)$. This ion was observed spectroscopically at $407\,nm$ corresponding to its predicted binding energy of $3.05\,eV$ [27].

Based on Applicant's detailed disclosure and reproducible examples, one skilled in the art would easily be able to practice the invention as claimed. The Examiner's use of circular arguments that "since the state of the art does not recognize hydrogen

species with an "increased binding energy", predicting how any given compound within the present claims is formed would be extremely difficult, even if these hydrogen species were shown to exist" is not persuasive. The claimed hydrogen species do exist since Applicant has formulated many of the claimed compounds and had them analyzed by independent laboratories and the Examiner has failed to show otherwise.

The Examiner completely ignores the fact that one skilled in the art can easily follow any one of the over 30 examples disclosed in the specification and obtain the same novel compounds and test results obtained by Applicant and over 20 unbiased laboratories, government agencies and universities. The disclosed examples are fully reproducible. Thus, contrary to the Examiner, not only will one skilled in the art be able easily predict how any given claimed compound is formed, but such a person will be able to form such compounds without undue experimentation.

(8) Breadth of the Claims

The Examiner states that "claims 290-295 recite numerous catalyst ion pairs, while the present specification does not show how these all can be made."

Applicant strongly disagrees with that statement since one skilled in the art knows very well how to make ions. For examples, ions can be made dissolving a salt in water. Ions can also be made by vaporizing inorganic compounds. Ions can also be purchased directly in commercially-available products. Ions can also be formed in a plasma. Formation of ions is entry-level chemistry and cannot possibly be considered so difficult so as to suggest that it would require undue experimentation.

The ionization energy of all ions is also well known in the art. What is not known in the art is combining the ions to provide energy acceptance of a multiple of about 27.2 eV. The present application clearly discloses how to combine these ions and, indeed, recites numerous exemplary ion pairs, as the Examiner so states. The present application discloses 33 detailed, reproducible, examples that one skilled in the art can easily follow using any desired catalyst according to teachings of the written description.

The Examiner also alleges that "the examples do not show how the different levels of p (where n = 1/p) may be obtained for the different hydrogen species." This

issue was already raised by Examiner Kalafut almost two years ago in the Office Action dated May 26, 1999, on page 2, paragraph 3, which states "[t]he specification, however, does not show how to make each hydride of the respective binding level." Applicant responded fully to that allegation in Applicant's Amendment dated July 23, 1999.

The present specification teaches that the energy transfer of $m\,X\,27.2\,eV$ from the hydrogen atom to the catalyst causes the electron of the hydrogen atom to drop $m$ levels lower from a radius of $\frac{a_H}{p}$ to a radius of $\frac{a_H}{p+m}$. The corresponding reaction is

$$H\left[\frac{a_H}{p}\right] \rightarrow H\left[\frac{a_H}{(p+m)}\right] + [(p+m)^2 - p^2]X13.6\,eV$$

Thus, by selecting the appropriate catalyst of $m\,X\,27.2\,eV$, the desired lower-energy hydrogen atom or hydride ion may be obtained.

Applicant also directs the Examiner's attention to Figs. 12, 15, 17, 19, 21, 29, and 42, which show identification of the different energy levels (1/2), (1/3), etc. page 6 of the specification also teaches the Binding Energy and Wavelength that can be used by those skilled in the art for the identifying hydrinos having different energy levels. One skilled in the art reading and comprehending the present specification will be able to practice the invention as claimed and form hydrinos of different energy levels (1/2), (1/3), etc., as desired, without undue experimentation.

For all of these reasons, Applicant submits that the full breadth of the claims is more than adequately enabled by the detailed written description and extensive supporting experimental evidence.

In view of the detailed written disclosure and extensive experimental evidence of record, Applicant submits that the claimed invention fully complies with Section 112, first paragraph. Accordingly, withdrawal of the Section 112, first paragraph rejection is respectfully requested.

## Conclusion

Applicant submits that the subject application has been in condition for Allowance since the original Notice of Allowance was mailed on October 18, 1999 and should be issued as a U.S. patent immediately. The Examiner has not fairly evaluated Applicant's extensive written description, including 33 working examples, and supporting experimental data, nor has he provided an cogent reasons as to why Applicant's invention is not patentable. As shown above, the Examiner has not only misapplied the patent laws and rules of procedure, but has gone even further in creating new patent standards that are inapplicable. Applicant has fully satisfied the legal requirements of Sections 101 and 112 according to established case law and the Examiner has failed to show otherwise.

Respectfully submitted,

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